

hp·ux/USR

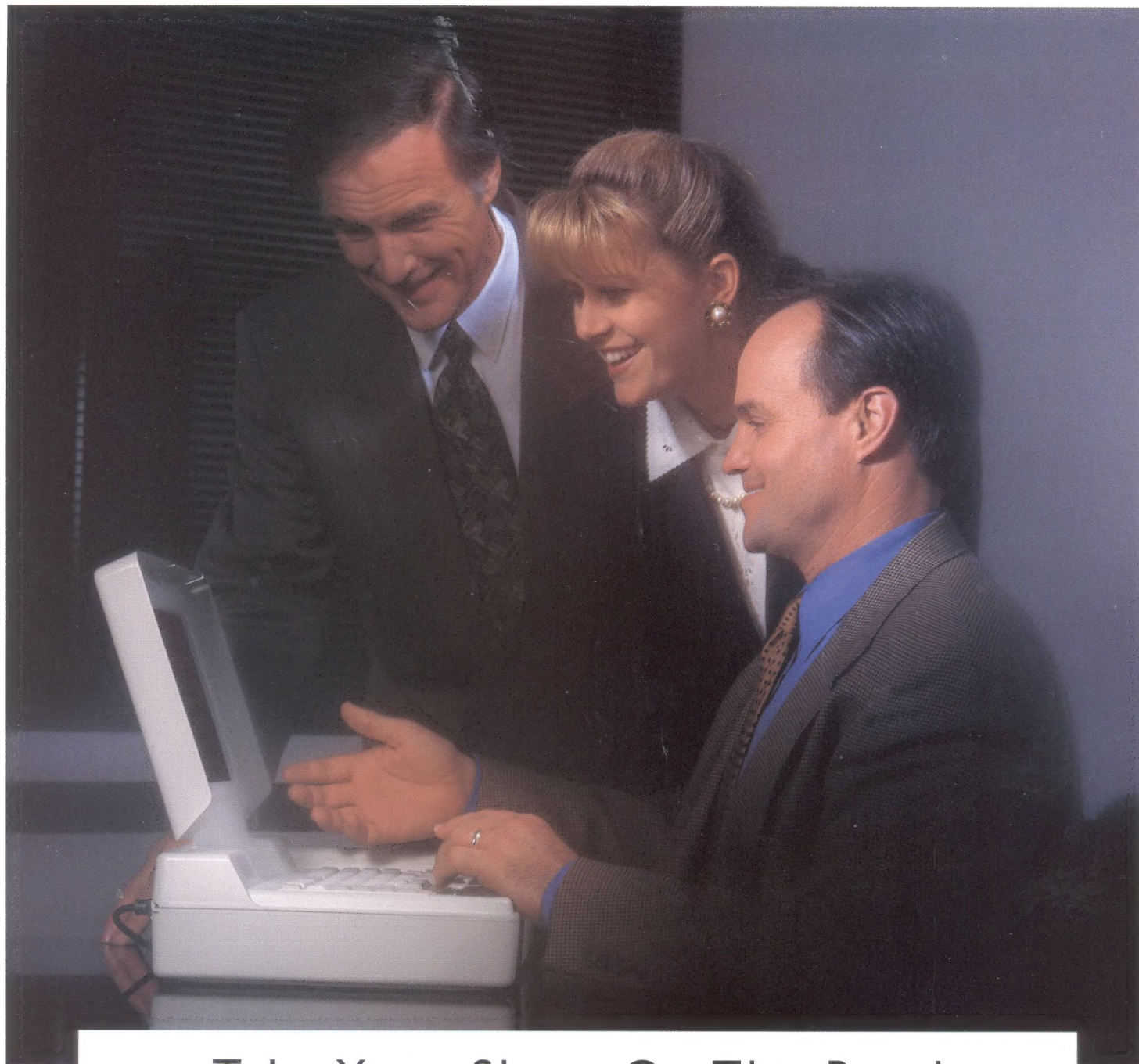
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CIRCLE 24 ON READER SERVICE CARD

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Alias Goodies

You work with files all the time—finding, zapping, moving around, and editing. Yitshak Merin takes you beyond the basics of aliasing with some neat aliases that make working with files a lot easier.

Yitshak Merin

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HP-UX Audit Overview

You might have unused disks on your system you don't even know about! Keeping track of system changes is a challenge. HP-UX Sys Admin expert Marty Poniatowski shows you how to get a handle on your system using a system audit program.

Marty Poniatowski

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Managing High-Availability Clusters Effectively

Software and hardware redundancy in your high-availability clusters keeps a single point of failure from interrupting those mission-critical applications, but the increased complexity of HA systems means they're harder to manage. Sherri Norwood, Julie Symons, and Mily Tsou look at the requirements and issues surrounding day-to-day cluster monitoring and management.

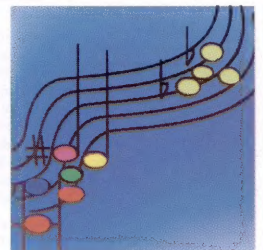
Sherri Norwood, Julie Symons, and Mily Tsou

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Software Review: Netscape Mail

Netscape Navigator integrates mail, news, and Web functions. How do the features of the Mail component of Navigator compare with those of other mail packages? Find out in Greg Cagle's review of Netscape Mail.

Greg Cagle



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Editor's Notes

A glance at the table of contents for this issue will tell you the System Administration column is missing. Not to worry: Chris Curtin, the author of that always popular column, is away from his home base working on a large project for his company, so he is taking a break from the deadlines of authorship to concentrate on deadlines of another sort. He will return.

The March/April issue of *hp-ux/usr* is loaded with material designed to warm a system administrator's heart. On the nuts-and-bolts side is an article on using aliases by Yitshak Merin. Yitshak is a systems engineer in the HP Response Center in Tel Aviv, Israel. I suppose most users of UNIX systems create at least a handful of well-known aliases—`rm='rm -i'`—so you don't accidentally wipe out a file, and so on. Yitshak presents several groups of aliases that make working with files much easier. He takes advantage of the `c` shell's ability to pass arguments to an alias in the `csh` versions and uses functions in the POSIX versions. Included is a nice trick using *xprop* (in `/usr/contrib/bin/X11`):

```
xprop -root | grep BUFFER0 | cut -f2- -d= | sed "s/*\"/"
```

That will return highlighted text in an `hpterm` or `xterm` window—try it.

Greg Cagle continues his survey of Mail applications in a review of Netscape Mail, which is part of the Navigator package. Netscape has strong multimedia capabilities and integrates mail, news, and browsing functions, but Greg points out a number of features that Netscape Mail lacks. If you're looking at mail/browser packages, be sure to read his review.

If you are a system administrator in a clustered system running mission-critical applications, you are aware of the advantages of high-availability clusters: the redundancy of software and hardware keeps a single failure from interrupting the flow of operations. These complex systems are often a challenge to manage and at the same time effective management is essential for keeping applications running smoothly. Administrators managing clustered systems will want to read the feature on managing high-availability clusters by Sherri Norwood, Julie Symons, and Mily Tsou. All three are software design engineers in the General Systems Solutions Lab who contributed to the development of HP ClusterView. Their article is an overview of the requirements and issues surrounding day-to-day cluster monitoring and management.

Our cover story this issue is by Marty Poniatowski. Marty has been a prolific writer in the last several years. Many of you no doubt have his books on HP-UX system administration. His topic this time is system auditing. We usually have a good idea of how a newly installed system is set up. But in time, new applications are loaded, the LVM structure changes, users leave the system, the operating system is updated, and on and on. How do we keep track of these changes? One way is to create an auditing program. Marty discusses those aspects of system auditing that virtually every installation will find essential. His examples are based on an HP-UX auditing program devised by Tom Dolan, a technical consultant with whom he works at HP.

Michael Ehrhardt
Managing Editor

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Product Focus

Stratus Continuum Series 400

Now HP-UX users can run their existing mission-critical applications on a hardware platform specifically designed to provide fault tolerance. Stratus Computer, Inc. has ported HP-UX 10.10 to its Continuum Series 400 computer, creating what is believed to be the first fault-tolerant system built upon open standards.

Scott Mitchell, director of Stratus' marketing programs, explained why Stratus decided to port HP's UNIX operating system to the Continuum server. "We see HP-UX as the most open UNIX (because of) HP's dominance in the marketplace." In March 1996, the Continuum server was released with Stratus' own brand of UNIX operating system, FTX (Fault-Tolerant UNIX). "We equated openness with FTX, because it was UNIX," Mitchell recalled.

But, like other vendors, Stratus began adding features to its UNIX-based operating system, which made it less than standard. Although Stratus will continue to offer FTX on Continuum servers, the Series 400 will feature HP-UX.

Series 400 also incorporates the PA-RISC 7100 chip in one- and two-way SMP configurations. Mitchell revealed that the Series 400 will feature PA-8000s by mid-1997 and that Stratus will follow HP's direction with processor and operating system upgrades, including the Merced architecture. "Our state of direction is in parallel with HP and Intel's chip technology. And that goes for operating systems, as well: We intend to support 3DA ("3-Dimen-

sional Architecture," the operating environment designed for the Merced processor)."

Stratus has designed the Continuum Series 400 to be an extension of HP's product line, so engineers are ensured that "layered products" that run on HP 9000s run on the Series 400. These products include HP OpenView and HP OpenMail, which can be purchased on the Continuum server as options, and other applications and middleware products by HP and third parties. To do this, engineers had to maintain 100-percent compatibility with the HP-UX Application Binary Interface (ABI) and API. As such, no changes have been made to the core HP-UX kernel, to HP-UX 10.10, or to shared memory.

All Stratus fault-tolerant services operate at a level below the core HP-UX operating kernel. This allows the server to incorporate fault-tolerant services, such as managing duplexed processors and common disks and replacing devices, without the user noticing any differences in the HP-UX operating system.

The Fault-Tolerant Design

Fault-tolerant services support the ability to pair subsystems and boards to provide the ability to run through failures. The system is comprised of two "logic suitcases," each of which has a motherboard, CPU, memory, and power supply. For every component, each instruction is performed on both halves of the motherboard at the same time. The two halves are checked, and if they compare, the output is sent to the bus or other part of the system. If one of the suitcases fails, the other continues to work. Disks, PCI boards, and power supplies all operate in duplex, so there is



no reduction in performance if one component is down. The system supports hot-plugging and removal of components, and I/O is redirected around failed components.

Failed components are indicated by warning LEDs. In the event of a failed suitcase, the server will automatically dial the Stratus Computer Assistance Center, which will do an online diagnosis. A new suitcase is shipped overnight, and it automatically brings itself into service when mounted.

Users can upgrade memory, CPU, and PCI cards online. Consistent with existing HP-UX implementations, users cannot upgrade HP-UX online.

Although one might expect such redundancy to slow down performance, Mitchell assured, "transaction throughput is expected to be at least 90 percent of HP's (9000s) based on TPC (benchmarks)." The TPC tests were expected to begin in February, but Mitchell's estimates were based on other tests. "(And) all other tests show we're tracking to that (90-percent) goal."

Enhanced I/O

Besides providing hardware-level fault tolerance, the Stratus Continuum adds value to the HP-UX product line by offering industry-standard PCI. Mitchell stated that the Series 400 "is the first system that is offering HP-UX and PCI," and that HP is also expected to support PCI sometime in 1997.

In addition to being standards-based, the Continuum I/O system adds provisions for driver error recovery, so that the operating system knows when a device is operational again, without necessitating a reboot of the system.

Stratus is also adding value to the HP-UX product line by providing Continuum

users with 24 x 7 support, which is necessary for users in fault-tolerant environments. Stratus support engineers are fully trained in HP-UX and will provide Level 1 and 2 support on the operating systems. Level 1 support will be available for some layered products. HP will continue to provide patches and changes to the operating system, but all patches and changes to the fault-tolerant services will come from Stratus.

Mitchell believes the partnership forged between HP and Stratus is comprehensive enough to position the Continuum Series 400 as an extension of HP's product line. He cited the seamless use of HP-UX-compatible applications and knowledgeable support provided with the system. He added, "Now (users) have a range of availability they can choose from." He acknowledged that "there's going to be situations where we'll take business away from HP, and there'll be situations where HP will take business from us. But together I think HP and Stratus are going to sell a lot more because our solution is better than that of IBM, DEC, or Sun."

Those organizations likely to benefit from fault-tolerant hardware range far and wide—any "businesses that lose customers or money if the application goes away," explained Mitchell. He noted that some current customers use the system for stock trading, funds transfer, and telecomm central switching units. Other uses, he said, include reservations systems, 911 systems, and warehouse distribution, because companies need to avoid "paying people union wage to stand around and do nothing" if the system goes down. Another use gaining in popularity is electronic commerce, which makes Web sites mission-critical. Mitchell cited HP's use of Web pages to

distribute patches as an example. HP doesn't use the Continuum Series 400, but he added, "they should. We will be providing bug fixes the way HP does, but ours will be on a fault-tolerant system." In fact, he said, most customer service operations are mission-critical, because "it costs nine times as much to get a customer as it does to keep one."

Availability and Pricing

The Continuum Enterprise Server is available for 30-day delivery. Systems are available in one- and two-way SMP on PA-7100 processors. PA-8000-equipped servers will be available in mid-1997. System prices range from \$70,000 to \$250,000, depending on configuration of processors, storage, and peripherals.

Contact Stratus Computer, Inc., phone: (508) 460-2934, e-mail: scott_mitchell@stratus.com, <http://www.stratus.com>. ■

Michelle Pollace, the New Products editor for hp-ux/usr magazine, writes Product Focus.



New Products

Design Analysis Software

Structural Research & Analysis has announced COSMOS/Works 2.0, which allows users to analyze their models directly within the SolidWorks window. Users can access and operate COSMOS/Works 2.0 features exactly as they access and operate SolidWorks features.

With COSMOS/Works 2.0 users can create a model with SolidWorks, select loads and boundary conditions as features on the solid model, apply material properties, mesh the model, analyze results, and visualize the analysis results in actual SolidWorks windows.

COSMOS/Works contains COSMOS/FFE as an analysis engine, which automatically chooses the most efficient way to solve problems, evaluates avail-

able computer resources, notifies users of lack of disk space prior to the start of analysis, and warns users if a model has been set up improperly.

Prices start at \$4,995 for the Basic Configuration when purchased at the same time as SolidWorks.

Contact SRAC, phone: (310) 207-2800, <http://www.cosmosm.com>.

DLT Backup

Storage Dimensions has also introduced three new DLT products that incorporate the DLT2000XT drive and offer capacities up to 120 GB, throughput performance up to 6 MB per second, and cost per megabyte as low as \$0.13. The DLT2000XT systems are said to provide higher capacity and performance than traditional 4-mm DAT and 8-mm alternatives at a 25 percent lower cost per megabyte.

The new DLT products include MegaFlex DLT2000XT Tape Array, JET Array 2000XT, and the 30-GB DLT2000XT.

The DLT2000XT Tape Array is priced at \$20,000, JET Array 2000XT at \$24,000, and the DLT2000XT at \$3,860.

Contact Storage Dimensions, phone: (408) 954-0710, fax: (408) 944-1200, <http://www.storagedimensions.com>.

Graphical Programming Language

National Instruments has announced the LabVIEW Professional Suite (PDS), designed to help LabVIEW users develop high-end, large-scale applications. Similar to tools available only for text-based languages like C, it provides graphical programmers with the tools needed for managing and tracking code in large development projects. PDS includes the LabVIEW Full Development Systems, the Application Builder, and the new Professional G

SRAC Cosmos/M

AutoCAD Design Verification

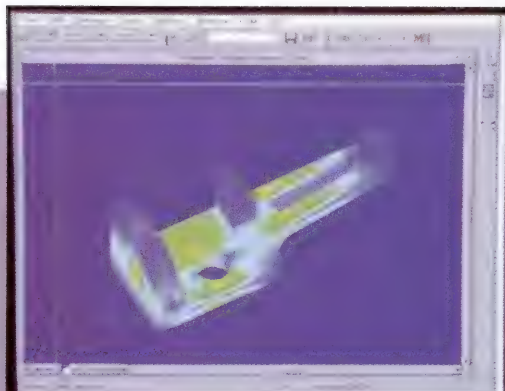
Structural Research & Analysis Corporation (SRAC) has announced COSMOS/M DESIGNER II for AutoCAD, a design verification system for users of AutoCAD Mechanical Desktop.

COSMOS/M DESIGNER II works directly with AutoCAD solid models, providing an easy-to-use GUI with automatic 3D meshing, along with icons, pulldown menus, dialogue boxes, and tool palettes.

The software relies on a one-step translation process. After translation, users prepare the model for analysis by applying loads and boundary conditions, choosing the material properties, and meshing it automatically. They can then analyze for stress, displacement, or frequency effects and view the results. Buckling and heat transfer analysis capabilities can be added at a later time.

The analysis engine for COSMOS/M DESIGNER II for AutoCAD is SRAC's Fast Finite Element (FFE), which evaluates computer resources and can even warn users if a model has been set up improperly.

Contact SRAC, phone: (310) 207-2800, <http://www.cosmosm.com>.



Thinking about DLT?

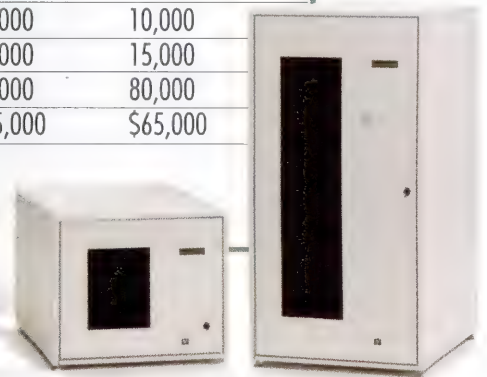
Think again! We know that many of you are thinking about DLT tape libraries. But recent advances in 8mm technology and a library made by StraightLine—might make you want to think again.

	StraightLine	StraightLine	ATL	ADIC
Model	SL-850	SL-8150	ACL 4/52	Scalar
Drive format	8mm*	8mm*	DLT 4000	DLT 4000
Number of tapes in library	50	150	52	52
Tape drawer(s)	Yes	Yes	No	No
Removable tape boxes	Yes	Yes	No	No
Sustained transfer rate (native)	3MB/sec	3MB/sec	1.5MB/sec	1.5MB/sec
Total capacity (native)	1.25TB	3.75TB	1.04TB	1.04TB
Bar code reader	Yes	Yes	Yes/6-digit	Yes
Number of drives	4 or 5	4 or 5	4	4
Head life (hours)	>20,000**	>20,000**	10,000	10,000
Media uses (passes)	20,000	20,000	15,000	15,000
Drive MTBF (hours)	200,000	200,000	80,000	80,000
Library list price	\$43,995	\$61,995	\$65,000	\$65,000

* Exabyte's recommended 8mm tape—Exatape 170M Advanced Metal Evaporated tape

Sony's recommended 8mm tape—SDX-T3N 170M Advanced Metal Evaporated tape

** Exabyte Mammoth head life—20,000 hours
Sony AIT SDX-300 head life—30,000 hours



Led by Exabyte and Sony, 8mm technology has taken a giant step forward in performance and capacity—3MB per second data transfer rate and up to 25GB per tape in native mode. With built-in compression, it's even better. And that's not all.

Reliability — DLT, once the leader in reliability, has been surpassed here, too. StraightLine took the best in 8mm drive technology and engineered a library with mainframe-class robotics— aerospace structural frame and optical sensing of mechanical movement. It's a powerful combination of reliability and performance at a really competitive price.

Easy to maintain — It can be expensive to replace DLT library drives. They have special tape ejection motors and a modified handle, and you can only get them from the library manufacturer. If you ever need to replace a drive in a StraightLine library, just remove four wing nuts, unplug the drive, and pop in an off-the-shelf replacement.

Built with the operator in mind — With seven years of experience manufacturing tape libraries, StraightLine knows how to make one that's operator friendly. Unique tape drawers slide tapes out of the machine to the user. There's no reaching in and around the robotics. It takes only seconds to exchange one tape or all the tapes, which are loaded in convenient tape boxes.

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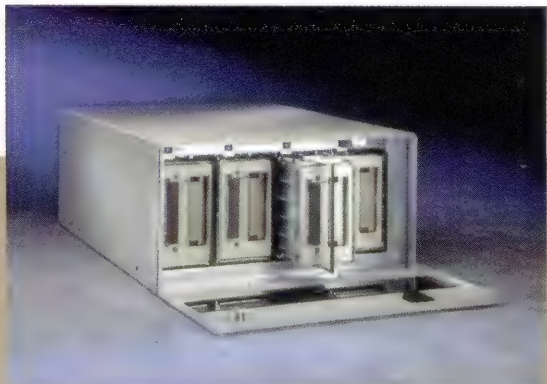
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Storage Dimensions JET Array

Backup Software

Storage Dimensions has announced JET Array for Windows NT and NetWare. JET Array integrates high-speed image-based backup software,

high-capacity Digital Linear Tape (DLT) drives, RAID protection, and a resilient storage enclosure for backup of mission-critical NT servers.

With support for both DLT 4000 and 2000XT drives, JET Array offers up to 160 GB of capacity while enabling NT customers to select the product with the best price/performance ratio for each application. The product offers a choice of RAID 0, 1, 0+1, and 5.

JET Array with four DLT 2000XT drives is priced at \$24,000. A fully loaded JET Array with DLT4000 drives is priced at \$32,000.

Contact Storage Dimensions, phone: (408) 954-0710, fax: (408) 944-1200, <http://www.storagedimensions.com>.

Developers Toolkit. For existing LabVIEW and BridgeVIEW users, the Professional G Developers Toolkit is available separately. It includes code management tools for source code control, code complexity metrics, and documentation utilities, as well as G programming standards. These new products are available for HP-UX, Windows NT/95, and other platforms.

The Professional G Developers Toolkit is priced at \$695; LabVIEW Professional Developers Suite is priced at \$3,495.

Contact National Instruments, phone: (800) 433-3488 or (512) 794-0100, fax: (512) 794-8411, e-mail: info@natinst.com.

New from Prentice Hall PTR

HP-UX System Management

Prentice Hall PTR has announced *Disk and File Management Tasks on HP-UX* by Tom Madell. The book presents information on system management cover-

ing both HP-UX 9.x and 10.x running on either Series 700 or 800 systems. The tasks covered include both conceptual and procedural information regarding disks, file systems, swap, and data.

The book's disk and file management strategies are designed to provide for more efficient use of system resources, potentially better performance, and less system downtime. Specific topics include: practical tips for converting to LVM and troubleshooting disk configuration; options for mirroring data with LVM; using disk striping to improve performance; and HP-UX's newest file system, VxFS (also called the Journaled File System).

Disk and File Management Tasks on HP-UX provides detailed examples to guide users step-by-step through each procedure.

Internet and Corporate Politics

Prentice Hall PTR has announced *Corporate Politics and the Internet* by James Gaskin, a practical guide to reducing a company's legal and business risks on

the Net. The book shows how to navigate a company through Internet-related legal, ethical, and personnel decisions, such as when is e-mail not private; how to give people Web access and keep them productive; how to protect company content against theft; how to limit company potential liabilities in cyberspace; and how to deal with internal security problems on the Net.

Corporate Politics and the Internet by James Gaskin (ISBN: 0-13-651803-6) is 300 pages and is priced at \$24.95.

Contact Prentice Hall PTR, phone: (201) 236-7139, fax: (201) 236-7131, <http://www.ora.com>.

Electronic Information Exchange

ISOCOR has announced its Global Directory Server for mission-critical corporate intranet applications and Internet Service Providers. Global Directory Server is a 93 X.500 Directory Service providing a solution for managing, updating, and replicating information and distributing it across multiple sites. The product provides support for 93 X.500 protocols, support of LDAP protocols, and scalability and distribution via Directory Services Protocol (DSP) and Directory Information Shadowing Protocol (DISP). The Global Directory Navigator (GDN) application, packaged with the Global Directory Server, allows remote management of multiple user sites, resulting in reduced administration and support costs.

Contact ISOCOR, phone: (310) 581-8100, fax: (310) 581-8111, e-mail: sales.info@isocor.com, <http://www.isocor.com>.

Application Development

Track Business Solutions (TBS) has announced TRACK Objects for the

Essbase toolset shipped with the TRACK for Windows product set. The EIS/DSS objects deliver flexibility and accelerate the rate of application development. TRACK Objects provides the functionality of an EIS with the minimum amount of effort required, making it the fastest available EIS/DSS development environment, TBS notes.

Because business executives are given the ability to create their own EIS-style reporting screens to sit on top of Essbase, they can create customized, data-driven, and dynamic reports in minutes.

Contact TBS, phone: +44(0)181 280 9800, fax: +44(0)181 280 8901, e-mail: info@tbs.co.uk, <http://www.dwl.co.uk>.

Electronic Commerce

Perwill Business Solutions has announced Version 6.0 of the PERWILL*EDI product set. The additional standards now fully supported by the product are CARGOIMP, AIRIMP, and IATA.

The new interactive capability, when implemented in a value-added network, permits the conversion of virtually any format of data to almost any other format, as part of the transmission through the service. This capability provides conversion from one EDI syntax to another while the transmission is underway.

Version 6.0 also includes all program and database "date" processing for the century field for the year 2000, including specific features for the conversion of six-digit dates to eight characters (to include century), and vice versa.

PERWILL*EDI Version 6.0 also has invoice and purchase order file interface definitions as defined by BASDA (Business Accounting Software Developers Association), ECA (Electronic Commerce Association), and TUG (TRADANET

Visual Development Software

National Instruments has announced new HP-UX run-time libraries for its Lab/Windows CVI visual development software for virtual instrumentation. With the LabWindows/CVI Version 4.0 Run-Time Libraries for HP-UX, users can port code developed on Windows NT, 95, or 3.1-based PCs to HP workstations, and then compile these applications using standard compilers for HP workstations.

The libraries are ideal for organizations in which Windows PCs are used for test design and HP workstations are used for factory production testing, the company notes.

LabWindows/CVI is an integrated visual development environment for scientists and engineers building virtual instruments. It gives users access to libraries for GPIB control, analysis, user interface, TCP, utility, and instrument drivers.

The LabWindows/CVI Run-Time Libraries for HP-UX is priced at \$1,495.

Contact National Instruments, phone: (800) 433-3488 or (512) 794-0100, fax: (512) 794-8411, e-mail: info@natinst.com.



User Group).

Contact Perwill Business Solutions, phone: +44 1420 545000, fax: +44 1420 545001.

Programming Perl

O'Reilly & Associates has announced the second edition of the Nutshell Handbook *Programming Perl* by Larry Wall, Tom Christiansen, and Randal Schwartz. This authoritative guide to Perl Version 5 tells readers how and where to obtain Perl, which is free and readily available. It also provides a more concise and readable way to do many jobs that were formerly accomplished by programming with C or one of the shells. Version 5 of Perl includes object-oriented programming facilities.

Programming Perl by Larry Wall, Tom

Christiansen, and Randal Schwartz (ISBN: 1-56592-149-6) has 670 pages and is priced at \$39.95.

Contact O'Reilly & Associates, phone: (800) 998-9938 or (707) 829-0515, fax: (707) 829-0104.

New from Xerox

Xerox and HP Print Solutions

Xerox and HP have announced a joint development and marketing agreement under which they will codevelop extensions to the HP Distributed Print Service to give users in high-performance HP computing environments complete access to the full capabilities of Xerox production printers.

Additionally, the companies will develop and market a gateway product to provide a common interface between



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Question & Answer

Q: How do I control colors, fonts, and other options in X Window programs?

A: The answer is, Lots of ways! The first recommendation is to get a copy of the O'Reilly book *Volume 3: X Window System User's Guide*, by Valerie Quercia and Tim O'Reilly. This book is a comprehensive reference on how X works. Be sure to get the Motif 1.2 version for the latest information.

The author of each X Window program will have documented (we hope) the resources for which it will take action; i.e., there will be a man page. A resource is something akin to an environment variable for shells in that the current setting of the variable affects actions and tests made by the shell commands.

One of the downsides is that a misspelled or unused resource generates *no* error message. This means that testing must verify that some action actually took place because the default is to ignore unknown resources.

As a program starts up, the available resources are gathered from various locations. The first source is `/usr/lib/X11/app-defaults`, where the class name of the program might appear. This file, which can contain one or many resources that the program can use, is considered to be a global resource for everyone who logs onto the system since it affects all copies of this particular program at startup.

(For the X aficionados, there are methods to assign resource values to the window manager at startup. I won't go into those details here.)

Class names (by loose convention) start with one or two capital letters, as in *XTerm* and *HPterm*. The rules for using one or two capitalized letters are (supposed) to be:

- First two letters are capitalized if the first letter is X.
- Only the first character is capitalized otherwise. *HPterm* is one of those pesky exceptions.

So in the *app-defaults* directory, you might see a set of names such as:

<i>Acctmgr</i>	<i>Editres</i>	<i>HPterm</i>	<i>Swjob</i>	<i>XLogo</i>
<i>Bitmap</i>	<i>Editres-color</i>	<i>Mwm</i>	<i>Swremove</i>	<i>XLogo-color</i>
<i>Bitmap-color</i>	<i>Helpaudio</i>	<i>Phigswidget</i>	<i>Vuefincalc</i>	<i>XTerm</i>
<i>Cdsbrowser</i>	<i>Helpcapture</i>	<i>RecServ</i>	<i>XClipboard</i>	<i>Xfd</i>
<i>CellMon</i>	<i>Helpimage</i>	<i>Sd</i>	<i>XClock</i>	<i>Xi4admin</i>
<i>Clock-color</i>	<i>Helpprint</i>	<i>Swcopy</i>	<i>XConsole</i>	<i>Xmag</i>
<i>Dcm</i>	<i>Helpprintrst</i>	<i>Swinstall</i>	<i>XLoad</i>	<i>Xmh</i>

Each name shown is a file and is referred to as a class name. The contents of *HPterm* might look like this:

```
hpterm*loginShell: true
hpterm*scrollBar: true
hpterm*background: Green
hpterm*foreground: Black
```


These resources indicate that by default, all copies of `hpterm` on this computer will use a login shell (i.e., they will execute the profile and shell config files) and will have a scroll bar on the right side and a green background with black letters. However, the `app-defaults` directory will be searched only if the user's local `$HOME` directory does not have a file with the correct name (i.e., `$HOME/HPterm`).

The next step in forming the resources for a specific client is to look for other application-specific files by looking in the directories listed in `XUSERFILESEARCHPATH` or `XAPPLRESDIR`. If either of these variables is set with a search path, the `/usr/lib/X11/app-defaults` directory will not be searched unless specified in the variable. As in the case of `/usr/lib/X11/app-defaults`, a file with a name that corresponds to the class (e.g., a file name of `HPterm`) that appears in any of the directories listed will be merged with the base of resources.

Now, if the environment variable `XENVIRONMENT` is set to the full pathname of a file, this file also will be merged into the resource base. If the variable is not defined, then the window manager will look for files in `$HOME` called `.Xdefaults` and/or `.Xresources`. Now it gets a bit tricky: VUE will not look at `.Xdefaults` but Motif Window Manager (`mwm`), VUE, and CDE will all look at `.Xresources`. A quick fix for this when you need different window managers is to link `.Xdefaults` and `.Xresources` together.

And finally, you can force any settable value on the program's command line by using Xtoolkit names such as `-fg` or `-bg` or by using `-xrm <option:value>` as in:

```
hpterm -bg blue -xrm background:red
```

This example sets the background to blue (`-bg`) and then to red (`-xrm`), which demonstrates that X resource settings are cumulative and the last occurrence of the item's name determines the final value.

As always, check the man page for information on settable values. But just in case the writer missed an option, you can use the `strings(1)` command on the executable program to look for additional X variables. Not a perfect solution, but it does provide some insights without having the source code of the program in front of you.

Q: I have a lot of questions about swap. Can you explain it a bit?

A: HP-UX is a virtual memory system and as such, all memory

is mapped into the virtual memory space before any program is launched. That's why you must have at least as much swap space as RAM. Swap on HP-UX is not additional to RAM; rather, RAM is a special case of swap space. This reservation mapping improves the performance of busy systems but can be a bit non-intuitive.

Two kernel parameters control the number of swap devices:

`nswapdev` (default 10) = max device-swap disks

`nswapfs` (default 10) = max file system swap locations

This means that up to 20 device-swap disks (or raw logical volumes) can be specified for a large total swap space. Similarly, `nswapfs` specifies that up to 10 file systems can be declared for use as swap locations. Since the static array containing device swap is only 36 bytes per entry, it is better to over-specify this value for future expansion. Similarly, each file system used for swap requires a 296-byte entry, so this can be adjusted as needed.

Swap performance depends on the total throughput of the system and, as with all disk devices, better throughput is obtained with multiple physical disks. Having several swap areas on the same physical disk will cause thrashing and a degradation in performance. Also, logical volumes that span multiple disks are less efficient than individual swap areas on separate disks.

Other tunable parameters are:

`swchunk` (def 2048) = number of 1024-byte blocks in a swap chunk

`minswapchunks` (def 1) = smallest number to be allocated

`maxswapchunks` (def 256) = largest number to be allocated

HP-UX deals with memory as 4-K pages, while the swap system starts with chunks and then subdivides the chunks into 4-K pages to map memory. To help manage swap devices and file system swap, the value of `priority` is available to keep lower performance devices at the end of the queue. Within a given priority, swap space is allocated in a round-robin fashion for each request. Once all swap areas of equal priority are full, the next priority devices are used. Priority runs from 0 through 10, with 1 being the default.

It is recommended that file system priority be a larger value since the overhead needed to read/write to a file system is much higher than for a raw device. Many users will use file system swap as a last resort to allow a onetime high load to run, even though there is plenty of RAM. Remember that all processes must be mapped into swap, even if they never use it. There is no actual I/O, just a map. Many of these programs will run to completion without actually swapping and therefore without the

file system space ever being used.

The downside to file system swap is that once a portion of the file system has been allocated (actually written), that space is not reclaimed and remains unusable in the file system until the system is rebooted.

swchunk is the unit of measure used by the swap subsystem when allocating swap space. Its value is the number of 1-K blocks in a swap chunk. Since process memory is handled by HP-UX in 4-K pages, it makes sense to make the value of *swchunk* an even multiple of 4K for efficiency. *swchunk* can be reasonably set in the range of 4 to 16384, but values large than this risk losing access to a portion of the swap area because the last swap chunk won't fit into the size of the disk.

Larger swap chunks slightly reduce the overhead of managing the chunks; smaller chunks make it easier to pack the swap space into odd-sized disks.

When allocating swap areas, the values *minswapchunks* and *maxswapchunks* come into play. The value for *minswapchunks* is used to initially allocate space, but for disk-based systems, it is a *nope* since swap is always available. For diskless cnodes, the value is useful to ensure that a minimum amount of space will be available—sort of pre-assigning some space just to that cnode for future use. Normally, this is set to 1 and serves as a way to verify that the first swap device is functional.

The maximum amount of swap space available on a given system is determined by a combination of the *swchunk* size and *maxswapchunks*. The HP-UX array *swaptab* is 36 bytes per *swapchunk*, so the total amount of swap space available is *maxswapchunks* * *swapchunk* * 1024. If the default *swchunk*

value of 2048 is used and *maxswapchunks* is set to 1024, then 1024*2048*1924 works out to 2 gigabytes.

Larger values are possible, but be aware of the growth of the *swaptab* table. A 4096 *maxswapchunks* value will allow 4 gigabytes of swap to be specified but will also consume 140 K of kernel memory. The manual states that the upper limit for swap is 2 GB, but the real limit is a function of RAM and kernel size. Remember that it is possible to generate a kernel that is too big to boot into memory.

One additional parameter of note: *swapmem_on*. This value (either 0 or 1) determines whether a portion of RAM (up to 75 percent) can be used to reserve additional space for virtual memory by allocating a portion of RAM called *pseudo-swap*. This is practical only on very large RAM systems where virtually all processes will be run in memory and swap space will not be used. In this case, a system with 2 GB of RAM could be run with only a few dozen megs of swap space and the rest of the reservation would take place in pseudo-swap.

For more information on swap space usage, use the command: *swapinfo -tm* where *-tm* means total space summary using megabytes as the unit of measure. The man pages for *swapinfo* and *swapmn* are useful starting points for details, along with the *System Administrator's Tasks* and the *Concepts* manuals.

Q: I have two 735 workstations running HP-UX 9.07. I have a single tape drive connected to one of the systems. How can I back up files on the system without the tape drive?

A: It is possible to back up files over the network with all three of the most popular utilities: *cpio*, *tar*, and *fbbackup*. In these examples *system_name* refers to the remote system with the tape device. All commands are performed from the system without the tape device. It is imperative to verify the device file for the tape device before attempting the backup.

cpio backup:

```
# cd /relative_path
# find . -hidden -depth -fsonly hfs -xdev | cpio -ovxcB 2>/tmp/index |\
# remsh system_name -l user "cat - | dd of=/dev/rmt/0m obs=5k"
```

If the relative path is */*, then you will perform a full backup. */tmp/index* is an index file of the backup. The *-v* option causes that output to be written to standard error.

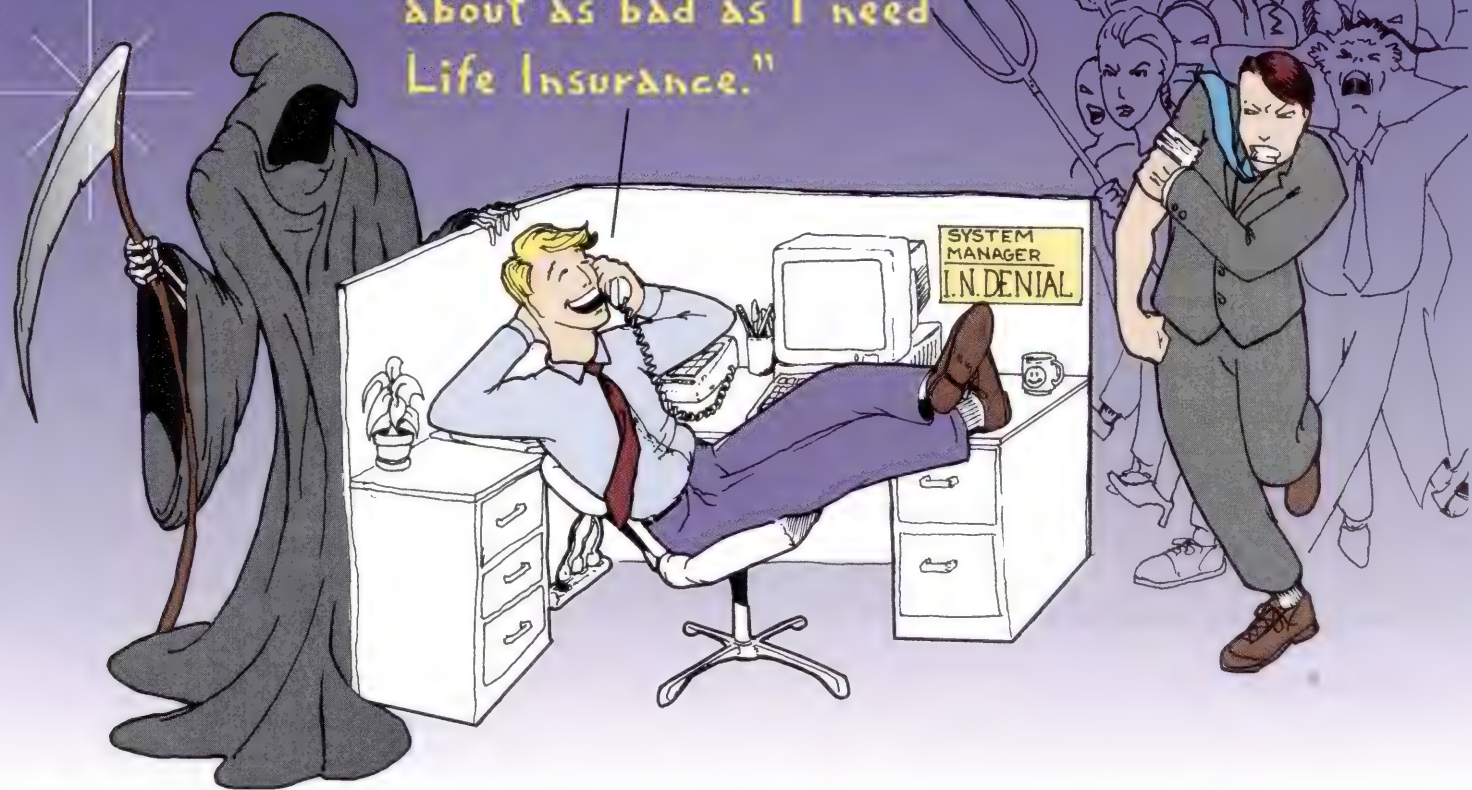
Note: *cpio* via network does not support multiple tapes.

cpio restore:

```
# cd /dir
# remsh system_name -l user dd if=/dev/rmt/0m bs=5k | cpio -icvdxuMB
```

If you are restoring from a backup that used relative paths, the files will be restored under the current directory. If absolute paths were used, the files will be restored according

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to their absolute paths. The current directory will have no bearing on their placement.

tar backup:

```
# cd /relative_path
# tar cvf - . | remsh system_name -l user "cat - | dd of=/dev/rmt/0m\
bs=10k"
```

tar restore:

```
# cd /relative_path
# remsh name -l user dd if=/dev/rmt/0m bs=10k | tar xvf -
```

Again, if the backup used relative paths, the files will be restored relative to the current directory. Otherwise, they will be written to their original path.

fbackup backup:

```
# fbackup -f system_name:/dev/rmt/0m -v -i /dir1
```

fbackup restore:

```
# frecover -r -vf system_name:/dev/rmt/0m
```

fbackup and frecover do not have the limitations of absolute and relative paths.

Q: I am a new system administrator. I have just downloaded a number of patches from the internet. How do I interpret the patch text?

A: Here are some of the important fields and what they mean. This is the patch text from *PHKL_9370*.

Filesets:

JournalFS.VXFS-BASE-KRN

This area lists the filesets that contain the files that will be modified by the patch.

Automatic Reboot?: Yes

This means that *swinstall* will automatically reboot the system after the installation of the patch.

Symptoms:

PHKL_9370:

If a customer upgrades from 10.01 or 10.10 to 10.20, and tries to increase his VxFS file systems via SAM, the file <text deleted>

PHKL_7776:

It's possible for a JFS file system to get into a state where it can't be mounted (except read-only), but fsck(1M) <text deleted>

This area lists the symptoms associated with this patch and the patches that it supercedes.

SR:

4701327544 4701341479

This area lists the service requests (SR's) or bug reports that are addressed by this patch.

what(1) Output:

```
/usr/conf/lib/libvxfs_base.a(vx_replay.o):
vx_replay.c $Date: 96/12/04
13:11:35 $ $Revision: 1.
2.98.10 $ PATCH_10.20 (PHKL_9370)
```

cksum(1) Output:

```
3189362898 6960 /usr/conf/lib/
libvxfs_base.a(vx_replay.o)
```

These areas list information about the modules the patch modifies. This information can be used to verify the installation of the patch. It is the most definitive way to do so.

Patch Conflicts: None

It's important to make sure that the patch does not conflict with any other patches. Conflicting patches would be listed here.

Patch Dependencies:

s700: 10.20: PHCO_9396

Hardware Dependencies: None

Other Dependencies: None

This area shows patches that must be applied first or hardware modules that must be present before the application of this patch.

Special Installation Instructions: None

Be sure to read this section before installing the patch. Additional steps might be required to achieve proper installation.

Q: I have created a depot on my 712 workstation running 10.20. How can I transfer the depot out to tape in SD format?

A: You will need to use the *swpackage* command. Refer to the man page for complete details and options. You

should be able to use the following command:

```
# swpackage -s <depot> -d <device>
```

<depot> = the directory path to the depot

<device> = the device file for the tape drive

This command will copy all products from the depot to tape. If you want to copy only selected products, you can list them on the command line or use the *-f* option to specify a file that contains a list of products:

```
# swpackage -s <depot> -d <device> <prod1> <prod2> <prod3>
```

Q: I have just updated my 712 from 10.01 to 10.10. The system had a number of patches applied while it was at 10.01. After the update I noticed a number of 10.01 patches listed in the output from *swlist*. Why are they there? What can I do about it?

A: *swlist* will continue to display the 10.01 patches that were installed prior to the update. Also, *swverify* will show output such as :

ERROR: The product "PHKL_6429,l=/,r=B.10.00.00.AA" is not compatible with this system's architecture or operating system.

Do *not* perform a *swremove* on these patches. When you perform a *swremove* of a patch, the applicable modules are overwritten by the modules that were saved when the patch was first installed. This could result in 10.10 modules being overwritten with older ones. The following information pertains to operating system patches only. Application patches may necessitate different actions.

At this time, patches are not fully integrated into Software Distributor. When SD updates a system to 10.10, it is not apparent that patches have been obsoleted by the new OS. Actually, you have two scenarios to be concerned with. As just mentioned, an existing patch may have been obsoleted. However, if the patch is applicable for the 10.10 OS as well as the 10.01 OS, the installation will effectively overwrite newer modules.

It's important to understand that *swlist* is displaying information from the Installed Products Database (IPD). It does not necessarily reflect what is actually installed on the system.

The IPD can be modified via the *swmodify* command. More importantly, you need to address the revisions of the associated software modules.

If a 10.01 patch on your system is fixed at 10.10, you may simply remove the appropriate entry from the IPD via *swmodify*. If a 10.01 patch is not fixed at 10.10, obtain the equivalent 10.10 patch and apply it to your system. Realize that the 10.10 version may be the same patch because of multiple target revisions. ■

General HP-UX questions are answered by Bill Hassell, a support engineer at the HP Atlanta Response Center. He can be contacted via e-mail at blh@hpuaerca.atl.hp.com. Workstation questions are answered by Susan Potter, an HP-UX system support engineer in the Atlanta Response Center. Her e-mail address is sup@atl.hp.com.



Alias

Goodies

We all use aliases.

Any decent shell provides an alias facility so that you can customize commands. With aliasing, you can define new commands or make standard commands perform nonstandard functions.

csh and its derivatives support the ability to pass arguments to an alias. This provides a very powerful and flexible mechanism to make your life easier.

Any UNIX user with even a little experience uses some of the aliases that have become “industry standard.”

by William E. Mars

Among these are:

```
alias rm      'rm -i'
alias h       'history \!* | more'
alias cd      'cd \!*; dirs'
alias psq     'ps -ef | grep \!* | grep -v grep'
alias x       'chmod +x'
```

I would like to present two sets of aliases in csh form that I have been using for many years. A POSIX shell version also is provided. I personally use the popular tcsh, which is identical to csh in its aliasing mechanism.

Operate on the Newest File

How often do you run a program that produces a file in the current directory? This could be a regular output file, a log file, or an update to an existing file. Sometimes the file has a fixed name known ahead of time; sometimes it doesn't. Many times the file name is something like *App_log.21567.oct-27*. In this case you have to run *ls* (or *ls -t*) to find the file name, notice that it is actually new and not the output of an older run, and then run *more* or *vi* on it. Often you use the mouse for that.

I suggest an alias that always finds the newest file in the directory and sets a variable to point to this file:

```
alias ff 'set first = `ls -t | head -1 | cut -f1 -d" "'`

ls -t      prints the files in the current directory, newest
           file first.
head -1    gives the first line of this output.
cut -f1 -d" " gives the first field of this output.
```

After executing *ff*, you get in the variable *first* the name of the newest file in the current directory.

Now this variable can be used for anything you need. You must run the *ff* (find-first) alias every time because the newest file might have changed since the last time.

Here are some examples of the ways I use *ff*:

```
alias +f      'ff ; more $first'
alias tf      'ff ; tail $first'
alias tff     'ff ; tail -f $first'
alias vf      'ff ; vi $first'
alias hf      'ff ; head $first'
```

Of course, many variations are possible.

Last file in the directory:

```
alias fl 'set last = `ls -tr | head -1 | cut -f1 -d" "'`
```

Biggest file in the directory:

```
alias fb set big = `ls -l | awk '{print $5" "$9}' | sort -rn |
                    head -1 | cut -d" " -f2`
```

Here *ls -l* gives a long listing.

awk '{print \$5" "\$9}' filters only the size and the name.
sort -rn sorts the files, biggest first.

head -1 gives the first one.

cut -d" " -f2 throws out the size, leaving the file name only.

Now you can make sets of aliases like the above to use *fl* and *fb*.

Here are the POSIX shell equivalents of the above aliases:

```
alias ff='first=`ls -t | head -1 | cut -f1 -d" "'`
alias mf='ff ; more $first'
alias tf='ff ; tail $first'
alias tff='ff ; tail -f $first'
alias vf='ff ; vi $first'
alias hf='ff ; head $first'
```

grep and Edit

Everyone uses *grep*. How many times have you run *grep*, seen the list of files your string was found in, and then edited these files? Here is a shortcut that does just that.

The idea is to catch the output of *grep*, get the file names from it, erase multiple entries and store the resulting list in a variable. Then you can run *vi* (or your favorite editor) on all the files in this variable, using the ability to give *vi* an initial command.

```
alias GREP 'set select = \!:1;my_grep \!:2-$'

alias my_grep 'set for_vi = (`grep "$select" \!* /dev/null |
                             tee /dev/tty | cut -d: -f1 | sort -u`)'

alias vv 'vi +/$select $for_vi'
```

This may look at first glance like some uuencoded file, but it is not.

The variable *for_vi* is assigned the output of *grep* with a few filters.
\!:1 is the first argument (the string to search for).
\!:2-\$ means take all the other arguments (the file names).
/dev/null is added there because if only one file is on the

command line, *grep* does not output the file name. This way a second file (*/dev/null*) is “forced.”

`tee /dev/tty` causes the output of *grep* to be seen on the terminal and go to the pipe.

`cut -d: -f1` filters out the line itself, leaving only the file name.

`sort -u` removes duplicate file names as the string may occur more than once in some of the files.

Now `vi +/$select $for_vi` enters *vi* on the found files, immediately searching for the string we wanted.

All you have to do is use *GREP* instead of *grep*. You get the same result on your terminal, and if you want to edit the files with the searched string, you just type `vv`.

Variations

If you are a C programmer, you might want to search in all the *.c* files in the current directory. Add this alias:

```
alias GREPC 'set select = \!*;my_grep *.c'
```

A nice addition to the above set is to use the mouse to point to the string you want to search for. Many times the string you are looking for is displayed on your terminal (possibly in another window). What would be nicer than just clicking on that string and then searching for it?

The best solution is to write an X-Motif C program that uses *XtGetSelectionValue*. That will work on any window. But I will be lazy and use *xprop*. This works on all hpterm and xterm windows. For most everyday tasks, this is enough. The *xprop* utility itself is available in */usr/contrib/bin/X11* on HP-UX 9 or 10.

```
set select = nothing
```

```
alias get_selection 'xprop -root | grep BUFFER0 | cut -f2 -d= | sed s/\\/\\/g'
alias gg 'set select = `get_selection`;my_grep *'
alias ggc 'set select = `get_selection`;my_grep *.c'
alias ggf 'set select = `get_selection`;my_grep \!*
```

Put the `set select` command in your *.cshrc* to have an initial value for *select*. *get_selection* outputs the string that is currently highlighted in any hpterm or xterm window. (Try it!)

`gg` *greps* all files for that string.

`ggc` *greps* *c* files.

`ggf` accepts the file list as an argument.

Many more variations are available.

Translating to the POSIX shell is a little more complicated here. The POSIX shell (*/usr/bin/sh* on HP-UX 10.x) does not support passing arguments to an alias. So I will use functions for those aliases that require arguments. Inside a function you can use *\$1* for the first argument and *\$** for all arguments, *shift* to shift the arguments, etc.

Note that the *sed* command in *get_selection* is slightly changed to eliminate the extra space in the output of *xprop*. This was not necessary in *csh*.

```
alias get_selection='xprop -root | grep BUFFER0 | cut -f2- -d= | sed "s/ *\\\\"/\\g"'
select=nothing
function my_grep
{
for_vi='grep "$select" $* /dev/null | tee /dev/tty | cut -d: -f1 | sort -u'
}
function GREP
{
select=$1;shift;my_grep $*
}
function GREPC
{
select=$*;my_grep *.c
}
function ggf
{
select=`get_selection`;my_grep $*
}
alias gg='select=`get_selection`;my_grep *'
alias ggc='select=`get_selection`;my_grep *.c'
alias vv='vi +/"$select" $for_vi'
```

Happy aliasing!

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HP-UX System Auditing

Things tend to get ahead of us in all aspects of our lives. If you don't keep up with something, the next thing you know, you've lost track of it. This is especially true with your HP-UX systems. They tend to grow a life of their own.

Right after you install a system and get it running, you know everything about it. Then, over time, you load additional applications, change the Logical Volume Manager structure, have users who are no longer on the system, update to a newer revision of the operating system, and make a variety of other changes that have a major impact on your system.

How do you keep up with these changes? Many diligent system administrators keep a log book of all activities performed on a system so that they can at least retrace their system administration steps. Others issue a lot of commands and nose around on the system on a regular basis so they get a feel for what is taking place on a system. This has traditionally been the standard UNIX approach—to get things working, move on to the next job, and come back to a system if some problem is reported. This approach, however, is not sufficient for the data center.

A good way to gauge the health of your system and ensure there are no significant holes in the way your system is set up is to devise an audit program. A technical consultant with whom I work at Hewlett-Packard has devised just such a program. It can be run on a regular basis and the results reviewed to identify any potential problems on the system.

Let's take a look at some of the aspects of a system that this audit program covers and you can determine whether or not these same areas should be reviewed on your system.

by Marty Poniatowski

What Should You Audit?

I have prefaced pretty much every system administration topic I've written about by saying, "Every installation is unique." Having given my standard disclaimer, let me list some areas to audit that apply to virtually every installation. You surely have others that are peculiar to your installation that should be included in an audit of your system(s).

- **Important Files:** The first thing any audit program should do is save the most important files on your system. You need to determine what files are important. When I cover this topic, I will give a listing of some important files you should consider saving on a regular basis.
- **Security:** Who can shut down your HP-UX system? Who has switched to super user in the last 24 hours? Have there been any failed attempts to log in as root in the last 24 hours? Are there old users in the */etc/passwd* file? Most system administrators can't answer these questions (I know I can't answer them about the system in my office.) There are simple security checks you can perform to answer these questions.
- **Logical Volume Review:** One Logical Volume Manager change can have a big impact on your system. I have worked at installations that had several unused disks in the system that the system administrator didn't even know about! An audit program should document your existing Logical Volume Manager configuration and perform some checks.
- **Performance:** How is swap set up? Putting two swap sections on one disk will provide lower performance. Have you run *sar*, *vmstat*, or *iostat*

recently? An audit should include a performance snapshot.

- **Disk Usage:** Who are the disk hogs on your system? There is a command to help you quickly determine this. You don't want old files, especially core files, floating around your system. An audit program should look for these.
- **Kernel:** Was your HP-UX kernel built with your existing */stand/system* file? A different system file may have been used. Can you use all of your hardware? You may have hardware attached to your system for which you do not have a driver built into your kernel.
- **System Boot:** Does your system boot smoothly? Run *dmesg* to see information produced at the last system boot.
- **System Crash:** See if the directory exists where core files would be placed and, if so, see if there are core files in it.
- **Printers:** Get printer status. Should you encounter a system disaster, it will be easier to rebuild your system printers' configurations if you have documented your printers.
- **Patches:** Report all patches currently installed on the system.
- **Networking:** Run all networking commands to get a snapshot of what is configured.

These are all worthwhile areas to document and audit. Even if you do not find a single problem, the audit will produce a document providing a snapshot of your system.

Let's take a closer look at some of these areas.

Important Files

In the event of a system catastrophe, it would be helpful to have saved all of your important system files. Here is a listing of some files you will want to save:

-rw----	1	root	syts	502	Apr	24	19:19	/tmp/IMPORTANT/PATCHES_ONLY
-rw----	1	root	syts	52561	Apr	24	19:19	/tmp/IMPORTANT/archive.imp
-rw----	1	root	syts	14317	Apr	24	19:19	/tmp/IMPORTANT/bootptab
-rw----	1	root	syts	1617	Apr	24	19:19	/tmp/IMPORTANT/hosts
-rw----	1	root	syts	3653	Apr	24	19:19	/tmp/IMPORTANT/inetd.conf
-rw----	1	root	syts	1347	Apr	24	19:19	/tmp/IMPORTANT/inittab
-rw----	1	root	syts	1462	Apr	24	19:19	/tmp/IMPORTANT/lvmrc
-rw----	1	root	syts	59667	Apr	24	19:19	/tmp/IMPORTANT/lvdisplay.out
-rw----	1	root	syts	2947	Apr	24	19:19	/tmp/IMPORTANT/netconf
-rw----	1	root	syts	5707	Apr	24	19:19	/tmp/IMPORTANT/passwd
-rw----	1	root	syts	2642	Apr	24	19:19	/tmp/IMPORTANT/profile
-rw----	1	root	syts	75759	Apr	24	19:19	/tmp/IMPORTANT/rc.log
-rw----	1	root	syts	7779	Apr	24	19:19	/tmp/IMPORTANT/services
-rw----	1	root	syts	257	Apr	24	19:19	/tmp/IMPORTANT/syslog.conf
-rw----	1	root	syts	615	Apr	24	19:19	/tmp/IMPORTANT/system
-rw----	1	root	syts	4996	Apr	24	19:19	/tmp/IMPORTANT/vgdisplay.out
-rw----	1	root	syts	2061	Apr	24	19:19	/tmp/IMPORTANT/vue
-rw----	1	root	syts	2061	Apr	24	19:19	/tmp/IMPORTANT/cde

Some of these files, such as *lvdisplay.out* and *vgdisplay.out*, contain a full listing of the logical volume information for this system. You never know when you will have to rebuild a volume group and having this information in a file can be handy. Notice also there are several files that contain patch-related information.

Security

Who can shut down the system? The *shutdown.allow* file lists those users who have permission to shut down a system. Make sure only the users you want to shut down a system have entries in this file.

When has the system been shut down and by whom is in *shutdown.log*. Part of *shutdown.log* with a panic is shown below:

```
16:58 Mon Feb 12, 1996. Reboot: (by system1!root)
21:49 Mon Feb 12, 1996. Reboot: (by system1!root)
16:46 Tue Feb 13, 1996. Reboot after panic: steven:
invalid relocation status
16:28 Sun Mar 24, 1996. Reboot: (by system1!root)
17:08 Thu Mar 28, 1996. Reboot: (by system1!root)
```

Very few users should be switching to super user. You may have users who need to make system adjustments in a development environment. In a production environment, however, you should very seldom see a switch to super user. The *su* file has in it all *su* commands issued. All of the following entries have switched from a user name to root.

```
SU 04/22 19:57 - tty2 mike-root
SU 04/22 19:57 - tty2 mike-root
SU 04/22 19:57 + tty2 mike-root
SU 04/23 11:00 + ttyu1 chang-root
SU 04/23 11:12 + ttyu2 denise-root
```

Bad login attempts in quick succession, or as root, can be viewed with *lastb*. The following example shows several bad login attempts as root.

```
root tty6      Tue Apr 16 13:00-13:00 (00:00)
root tty6      Tue Apr 16 13:01-13:01 (00:00)
root tty6      Tue Apr 16 13:01-13:01 (00:00)
root tty6      Tue Apr 16 13:02-13:02 (00:00)
root tty6      Tue Apr 16 13:02-13:02 (00:00)
root tty6      Tue Apr 16 13:03-13:03 (00:00)
root tty6      Tue Apr 16 13:03-13:03 (00:00)
```

Use *pwchk* to check the */etc/passwd* file looking for all types of problems. This command performs a sanity check on the *passwd* file which, although not a log file, is an important file that should be monitored closely. The following are two errors in the *passwd* file that were found by *pwchk*. The first is a user with a *passwd* entry but with no files on the system. The second is a user with an incorrect home directory name:

```
denise - Login name not found on system
```

```
j lance:Khad sf4353had sf ae:110:20:Joe Lance,,,:/net/sys1/net/
sys1/home/j lance:/usr/bin/sh
```

```
Login directory not found
```

Use *grpck* to check the */etc/group* file looking for all types of problems. This command performs a check of the *group* file, which must also be carefully monitored. The following example shows a *group* entry in which there are no users present and a group that contains a user for whom there is no entry in the *passwd* file:

```
database:10:
    No users in this group
development1:*:200:nadmin,charles,william
    william - Login name not found in password file
```

Logical Volume Review

Check the integrity of the *lvmtab* file. One way of doing this is to compare *strings lvmtab* with *vgscan -v -p*. In the following example, the output of *strings lvmtab* is used as input to *vgscan* and this yields an unused volume group.

```
# vgscan -v -p

/dev/vgsys
/dev/dsk/c2d0s2
/dev/dsk/c3d0s2

/dev/vgtext
/dev/dsk/c4d0s2
/dev/dsk/c5d0s2

/dev/vgroot
/dev/dsk/c4d0s2
/dev/dsk/c7d0s2
```


The volume group /dev/vg00 was not matched with any Physical Volumes.

Scan of the Physical Volumes complete.

```
# ll -d /dev/vg*
```

```
drwxrwxrwx 2 root    root    1024 Nov 7  1995 /dev/vg00
drwxrwxrwx 2 root    sys     1024 Jan 20 1996 /dev/vgroot
drwxrwxrwx 2 root    root    1024 Nov 7  1995 /dev/vgsys
drwxrwxrwx 2 root    root    1024 Nov 7  1995 /dev/vgtext
```

The command `ll /dev/vg*` shows four volume groups, only three of which are used. `/dev/vg00` exists but is not in use.

A common problem with a mirrored root volume is that the data is mirrored but there is no boot area on the mirror. If the primary root volume becomes unbootable, you won't be able to boot from the mirror. Identify bootable areas with `lifs -Clv /dev/rdisk/*`. You can also run the `lvlnboot` command to see all disks that are bootable. The following example shows a root disk (`c0t6d0`) as bootable as well as its mirror (`c1t3d0`).

```
# lvlnboot -v
```

Boot Definitions for Volume Group /dev/vg00:

Physical Volumes belonging in Root Volume Group:

```
/dev/dsk/c0t6d0 (10/0.6.0)  - Boot Disk
/dev/dsk/c1t3d0 (10/4.4.3.0) - Boot Disk
```

I am surprised at the number of times unused disks are found on a system. The following subroutine of an audit program identifies unused disks with the output of `ioscan` providing input to `pvdisplay`.

```
pvtest ()
{
for me in `ioscan -fkC disk | awk '{print $3}'`
do
if [ "$me" != "H/W" ]
then
echo "\n$PROG>>>> from ioscan -fkC , check PV info" |
tee -a $DESTF
diskn=`lssf /dev/dsk/* | grep $me | grep 'section 0' |
awk '{print $16}'`
```

```
echo "$PROG>>>> the disk is $diskn" | tee -a $DESTF
```

```
echo "$PROG>>>> listing first 25 lines by: pvdisplay -v $diskn | \
head -25" | tee -a $DESTF
```

```
pvdisplay -v $diskn 2>&1 | head -25 | tee -a $DESTF
```

```
fi
```

```
done
```

```
}
```

Here is the result for a disk that was not identified as part of a volume group:

```
pvdisplay: Couldn't query physical volume "/dev/dsk/c0d0s2"
```

The specified path does not correspond to a physical volume attached to any volume group. This means that the disk is physically attached to the system but is not in a volume group.

Performance

Performance is a discipline unto itself. You are not going to perform a detailed performance analysis as part of a system audit. You can get a snapshot of your system that you can later sit down and review, however, which may provide some interesting results.

As part of the audit you should run the following performance-related commands: `vmstat`, `iostat`, `uptime`, `sar -u` and `sar -b`. The following are examples of running `sar -u` and `sar -b`.

```
# sar -u 5 5
```

```
HP-UX system1 B.10.20 A 9000/819 12/24/96
```

```
19:08:02 %usr %sys %wio %idle
19:08:07 1 2 1 96
19:08:12 1 1 0 99
19:08:17 0 1 0 99
19:08:22 1 1 0 98
19:08:27 0 1 0 99
```

```
Average 1 1 0 98
```

```
# sar -b 5 10
```

```
HP-UX system1 B.10.20 A 9000/819 12/24/96
```

```
19:08:27 bread/s read/s %rcache bwrit/s lwrit/s %wcache pread/s pwrit/s
19:08:32 0 46 100 0 5 100 0 0
```


19:08:37	0	28	100	1	4	80	0	0
19:08:42	0	13	100	0	0	0	0	0
19:08:47	0	0	0	0	0	0	0	0
19:08:52	0	37	100	0	0	0	0	0
19:08:57	0	6	100	1	2	50	0	0
19:09:02	0	29	100	0	0	0	0	0
19:09:07	0	27	100	2	4	59	0	0
19:09:12	0	13	100	0	0	0	0	0
19:09:17	0	0	0	0	0	0	0	0
Average	0	20	100	0	2	77	0	0

Swap space is often overlooked in tuning performance. If swap is properly configured, you can get much better performance than you do if it is inefficiently configured.

Run *swapinfo -at* and *swapinfo -m*. Swap is sometimes added to systems in a random fashion. The following example shows two swap sections on */dev/dsk/c0t6d0*.

```
# swapinfo -at
```

	Kb	Kb	Kb	PCT	START/	Kb			
TYPE	AVAIL	USED	FREE	USED	LIMIT	RESERVE	PRI	NAME	(disk)
dev	512000	0	512000	0%	0	-	1	/dev/vg00/lvol2	c0t6d0
dev	274432	0	274432	0%	0	-	0	/dev/vg00/lvol8	c0t6d0
dev	262144	0	262144	0%	0	-	0	/dev/vg03/lvol20	c1t4d0
dev	524288	0	524288	0%	0	-	0	/dev/vg02/lvol21	c1t2d0

It is not a good practice to put two swap sections on the same disk as has been done with *c0t6d0* in this example. It is better to distribute the load among multiple disks and to have the sections the same size to enhance interleaving swap. This size should also be big enough to hold a core dump.

Disk and File System Information

The first thing you need to know about how your disks are being used is which users are consuming the most space. The following subroutine from an audit program uses the *diskusg* command to determine the disk hogs.

```
diskhogs ()
{
for fs in `bdf | grep '^/' | awk '{print $1}'`
do
fsys=`fstyp $fs`
if [ $fsys = vxfs ]
then
echo "$PROG>>>>finding hogs for filesystem $fs by vxdiskusg $fs"
| tee -a $DESTF vxdiskusg $fs 2>&1 | tee -a $DESTF
```

```
else
    # assume hfs type
echo "$PROG>>>>finding hogs for filesystem $fs by diskusg $fs"
    | tee -a $DESTF diskusg $fs 2>&1 | tee -a $DESTF
fi
done
}
```

Here is an example of finding hogs for file system `/dev/vg00/lvol6` mounted as `/usr`.

```
# diskusg /dev/vg00/lvol6

0      root          105254
1      daemon        304
2      bin            375704
5      uucp           882
9      lp             386
101    jclairmo       36
102    mike           43580
```

`find` can be used to uncover information such as large old files, for example, those greater than 1 MB and older than 120 days, as in the following:

```
# find / \( -fsonly hfs -o -fsonly vxfs \) (-atime +120 -a -size +1000000c \)
                                         -print |      xargs -nl 11

-rw----- 1 jhowell  users    2150400 Nov  1 00:44 /home/jjersey/acrobat/READ.TAR
-rw----- 1 jhowell  users    3921920 Nov  1 00:44 /home/jjersey/acrobat/HPUXR.TAR
```

The following command can be used to find all core files on your system.

```
find / \( -fsonly hfs -o -fsonly vxfs \) -name core -exec what {} \
    Kernel, dmesg, printer, crash, and syslog
```

This section could almost be called miscellaneous because it covers several different areas. The first area is I/O.

Run `ioscan -fk` to check the kernel. You may find errors such as hardware for which there is no driver installed as in the following example.

Class	I	H/W Path	Driver	S/W State	H/W Type	Description
			.			
			.			
			.			
disk	4	10/4/4.1.0	disc3	CLAIMED	DEVICE	HP C2490WD
unknown	-	9	?	No_Driver		

The middle of this `ioscan` output shows that there is an “unknown” device at hardware path 9 for which there is no driver installed. Although you don’t know what this is and it is probably not serious, this is the purpose of the audit program—to identify potential problems on your system.

I very seldom watch a system boot, yet there can be some revealing information produced at boot time. Running `dmesg` can show problems uncovered at boot, such as the following message showing the `/var` logical volume as full.

```
/var
file: table is full
file: table is full
file: table is full
file: table is full
file: table is full
file: table is full
file: table is full
file: table is full
file: table is full
file: table is full
file: table is full
file: table is full
file: table is full
file: table is full
file: table is full
file: table is full
file: table is full
file: table is full
```

You can determine if the existing kernel was built with `/stand/system`. Run `system_prep -s` and compare it to `/stand/system`. The following routine performs this check.

```
kgen () {
{
system_prep -s /tmp/kern$$
diffs=`diff "/tmp/kern$$" /stand/system`
if [ ! -z "$diffs" ]
then
```



```

echo "the system file is different: $diffs"
echo "/stand/vmunix WAS NOT built with /stand/system"
else
echo "/stand/vmunix was built with /stand/system"
fi
}

```

One area of your system that you might have a difficult time rebuilding is printer-related setup. Run the following commands and save the output for future reference.

```

lpstat -s
lpstat -d
lpstat -t

```

If your system crashes, `/var/adm/crash` is used to save the core dump to your file system. The following routine checks if this directory exists.

```

Savecore() {
{
echo Savecore >&2
echo "\t$0\t$1"
echo "\n\n"
echo "$0\t$1\n\n"
echo "The /var/adm/crash directory is needed by savecore in order to save the status"
echo "if a system crash occurs. The coredump can then be copied to a file and"
echo "sent to HP for analysis."
echo "Scancore can be used to analyze the coredump "
echo ""
echo "      savecore saves a core dump of the system (assuming one was made when"
echo "      the system crashed) and writes a reboot message in the shutdown log"
REMEMBERCORE=0
if [ -d /var/adm/crash ]
then
echo "\n\t/var/adm/crash exists \c"
if [ -r /var/adm/crash/hp-core.? ]
then
echo "and contains a dump."
echo "\n\tPlease copy the dump in /var/adm/crash to the tape">&2
echo "\tcd /var/adm/crash\n\ttar rv *" >&2
REMEMBERCORE=1
else
echo "and contains NO dump."
fi
else
echo "\n\n WARNING: /var/adm/crash did not exist." >&2

```

```

echo " use mkdir -p /var/adm/crash "
fi
} | tee -a $DESTF
}

```

Patches

Whether or not the patches are in order on your system, you need to include an inventory of patches as part of the audit. Patches are difficult to keep up with but are essential to the proper operation of your system. The first few lines of each patch you have installed give a description of the patch, including its number. A good audit program will read this information and save it in a file so that you have this in the directory with your other important files.

Networking

System administrators spend a lot of time setting up networking. If you encountered a system disaster of some type, it would be helpful to have thorough documentation of your networking setup. The following bullets describe some of the more common areas of networking to check.

- See if your system is an NFS server and check `/etc/exports` for exported file systems.
- Check `syslog` for errors with the following command:

```
# grep err /var/adm/syslog/syslog.log
```

- Check rpc registration with

```
# rpcinfo -p
```

- Check your system information with DNS:

```
# nslookup $HOSTNAME
```

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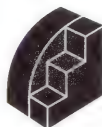
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- Check for `/etc/resolv.conf`, which would indicate that your system uses DNS: `# /usr/sbin/uucp/uucheck -v`

```
# ll /etc/resolv.conf
```

- View LAN devices with

```
# ll /dev/lan*
```

- Check LAN cards by running *lanscan* for all interfaces.
- Check the kernel for LAN card configuration with

```
# ioscanner -funC lan
```

- Show routes with

```
# netstat -r
```

- Check for SNA with

```
# snapshotnet
```

- Check for uucp with

Auditing your system becomes increasingly more important as you make changes to it. The auditing I have covered in this article does not even touch on the applications you are running. Having a well-documented system and putting effort into reviewing the audit results will pay dividends in the long run. Fixing the small problems you find as a result of the audit may prevent much bigger problems down the road. ■

Marty Poniatowski, a technical consultant with Hewlett-Packard in the New York Area, works on both server and workstation installations. He has written more than 50 technical articles in computer industry trade publications. He has also written three books published by Prentice Hall: Learning the HP-UX Operating System (1996), on which this article series is based; HP-UX 10.x System Administration (1995); and The HP-UX System Administrator's "How To" Book (1993). All can be ordered by calling (203) 377-4746.

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by Sherri Norwood

Managing High-Availability Clusters Effectively

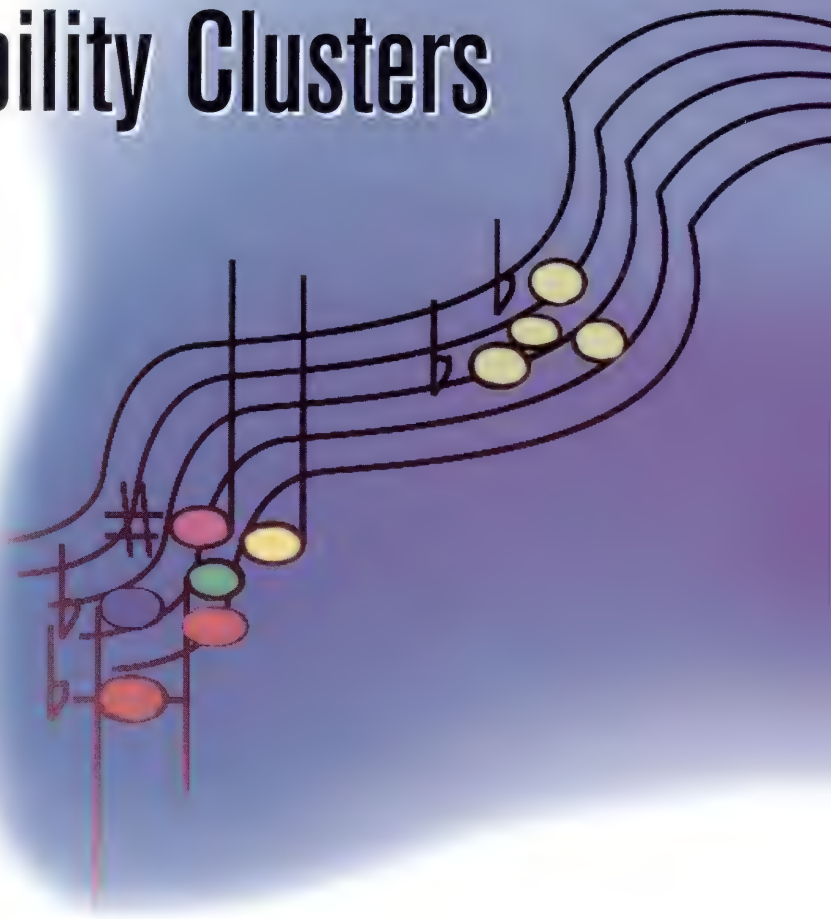
High-availability (HA) clusters provide redundancy of software and hardware so that a single point of failure will not interrupt service. The complexity that makes these systems highly available also makes them more difficult to manage. Yet effective cluster management is essential when these servers are running mission-critical applications. System managers must be aware of the issues surrounding high-availability cluster management. In addition, distributed management tools must address the complexity added by redundant hardware, software, and networks. It is important for system managers and operators to know the current status of the cluster, be informed about any changes in the cluster, and successfully troubleshoot problems in a cluster environment.

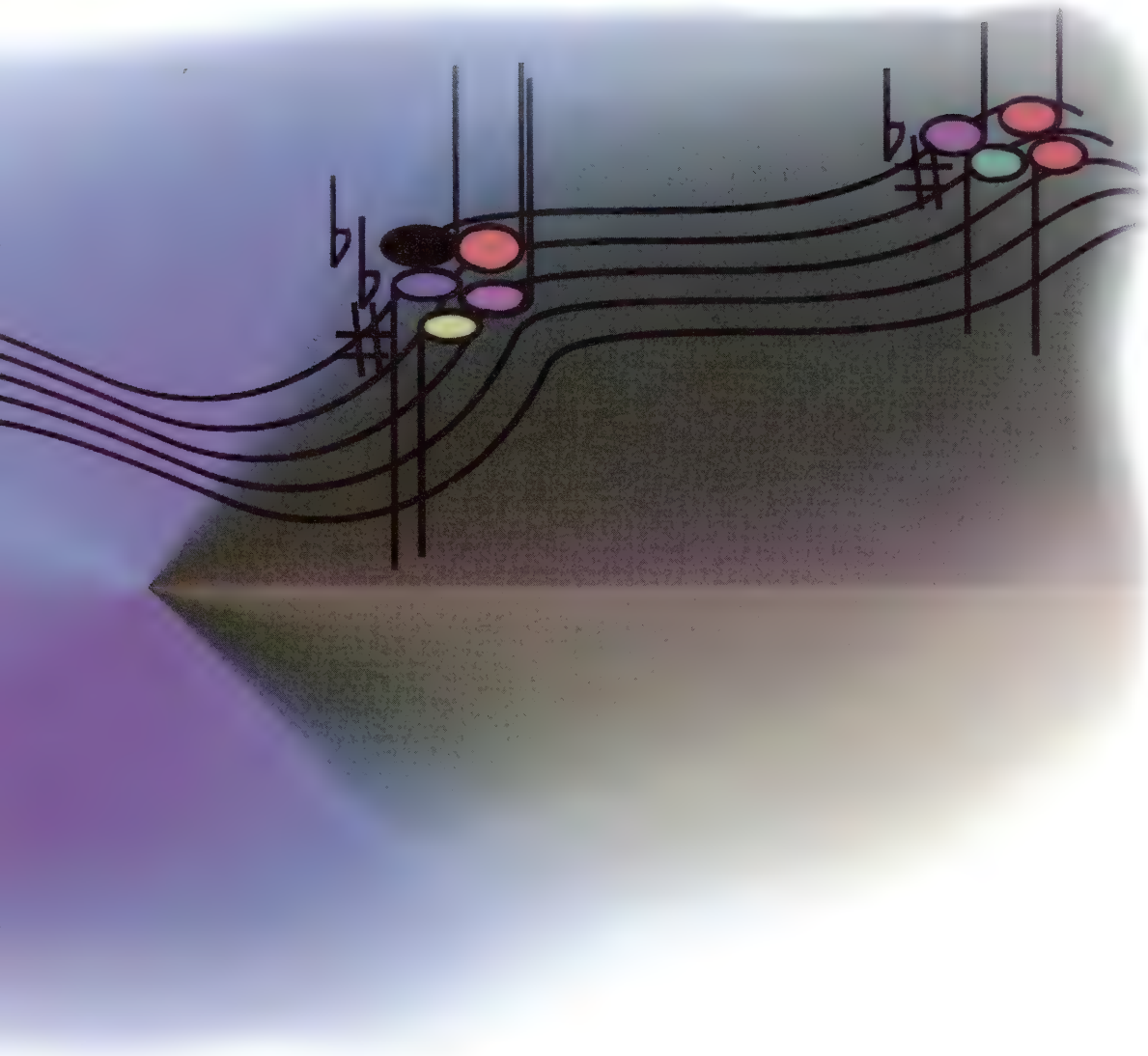
We will discuss the requirements and issues surrounding day-to-day cluster monitoring and management, along with the solutions we have implemented. Our solution is specific to MC/ServiceGuard clusters; however, the concepts presented will help any system manager think through the issues that must be addressed when selecting or developing a tool to manage high-availability clusters.

Challenges in Managing a Clustered Environment

In an MC/ServiceGuard environment today, up to eight computers (nodes) can be networked together to create a

high-availability cluster. Availability is increased by configuring shared buses, mirrored disks, and redundant networking components. (See *Figure 1* for a possible configuration.) Applications that must be highly available are assigned to packages, along with any resources they need to function correctly. If a LAN card fails, a backup card can be used. If the node or one of the resources fails, MC/ServiceGuard moves the entire package, including the applications, to an alternate node. Often this includes moving an IP address along with the package so that the move is nearly transparent to the users. The complexity of redundant components results in a configuration that is more difficult to manage, yet more important to manage successfully.





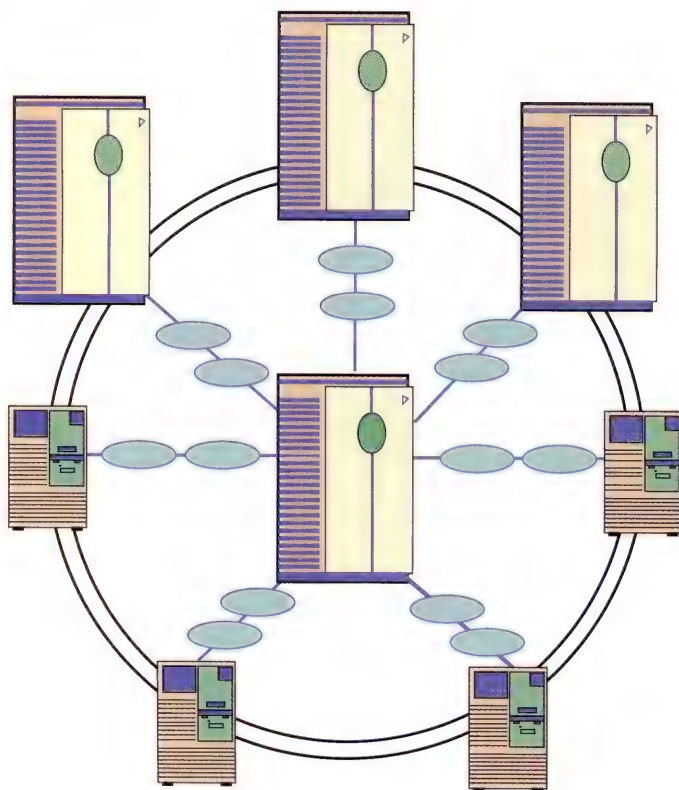
Managing a high-availability cluster must be approached differently from managing a non-HA stand-alone system. In a stand-alone environment, a failed component results in an application failure. The system manager may get an urgent phone call from an end user indicating that the application is down. In an HA clustered environment, the application package will fail over to another node in the cluster with little or no visibility to the application users. To ensure future redundancy and availability, the system manager must be informed that

the failover occurred, determine what caused the problem, and fix it.

When a package fails, the most important thing is to determine whether or not it has successfully started on another node. When troubleshooting this scenario, the availability of the application is most important. Secondly, the cause of the failure must be determined. No longer can a system manager log onto a single system and solve the problem; multiple systems may be involved.

Given the complex distributed nature

of HA clusters, a distributed management solution with a single management station is needed. This solution must be able to show the current status of the cluster, notify the system manager of problems or changes, and assist the system manager in troubleshooting and fixing the problem. Each node in the cluster should inform the management station of changes regarding status or configuration. In addition, at any point in time, the system manager should be able easily to view the current status of the cluster. We selected HP OpenView Network Node

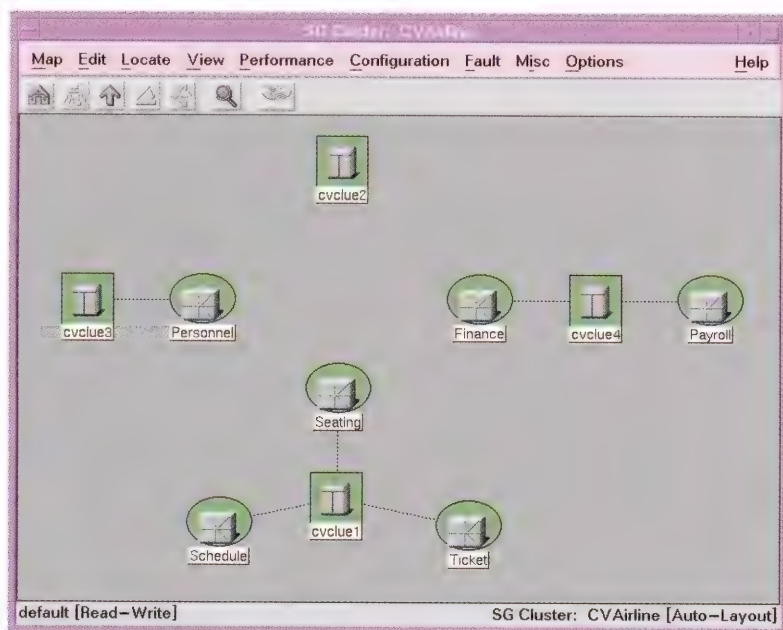
FIGURE 1 Enterprise Cluster with MC/ServiceGuard

Manager (NNM) and IT/Operations (ITO) as a platform for HP ClusterView, an application to monitor and manage high-availability clusters. NNM provides network autodiscovery and monitoring through SNMP, while ITO provides a problem management and troubleshooting platform.

Cluster Status Monitoring

HP OpenView Network Node Manager (NNM) provides an integrated network management and system management platform. Applications can be integrated under a common graphical user interface. Maps provide a consolidated view of the network topology of an enterprise's network environment. Status is reflected in real time. But NNM by itself is focused on network management. It provides for the monitoring of IP addressable objects in a network environment. It is very node- or IP-centric. Thus, it has no notion of a cluster as a collection of nodes. Without editing the map, there is no way to group nodes that are members of the same cluster.

HP ClusterView introduces a cluster-centric model to the HP OpenView environment. It provides monitoring of HA clusters through NNM, enabling not only the grouping of nodes belonging to the same cluster but also the monitoring of clusters, nodes, and packages. HP ClusterView provides a consolidated view of a cluster's topology, grouping the member nodes and packages in a single submap. The cluster nodes communicate to the management station via SNMP traps whenever there are changes regarding the status or configuration of the cluster. This allows the system manager to determine the status of cluster components in a distributed cluster environment from a single management

FIGURE 2 HP ClusterView Submap

station. It eliminates the need to run commands on the individual nodes of a cluster or clusters. Additionally, cluster administration via SAM and more detailed HA cluster status and configuration information are available through the menu bar.

HP ClusterView automatically discovers HA clusters and reflects the cluster status through symbols on the HP OpenView map. HP ClusterView creates submaps and symbols on the HP OpenView map to display the current status of the cluster. The submap is designed also to show the cluster configuration in terms of the nodes that are currently active members of the cluster, the packages, and where the packages are currently running (see *Figure 2*). Status is reflected through the use of different colors for the symbols on the submaps. The map is updated when events occur on the cluster nodes.

HP ClusterView has been designed so that package status is of primary importance and node status is secondary. For example, if a cluster node fails, the system manager will first want to see that its packages have failed over to an alternate node and are available to the end users and then troubleshoot why the node failed.

For HA clusters, operational status is important, but it is also very important to monitor the HA status, ensuring that there is never a single point of failure. For example, when a package fails and successfully starts on another node, the package may be "UP," but it may be less highly available now. In addition to the IP status, the status of the node relative to the cluster also is important. So, the submap also shows all the configured nodes and whether or not they are active members of the cluster.

Continued on Page 40

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Again, in an HA environment, it is most important that the packages be up and running, but it is almost equally important to know whether the packages are still highly available. Several package states (colors) can be used to illustrate a package's status with respect to high availability: a package is running with all of its configured failover nodes available, a package is running but not all of the failover nodes are available, or a package is running but none of the failover nodes are available.

Cluster Event Notification

While monitoring shows the current HA cluster status, it is only a snapshot in time. For example, if the system manager leaves his or her desk for a coffee break, he or she may return and not realize that the map has changed. Therefore, in addition to monitoring the status, it is also important to notify the system manager of changes to the status of the cluster.

HP ClusterView uses the same underlying mechanism to provide event notification that it uses for status updates for the monitoring of HA clusters on the submaps. When an important event affecting the cluster status or configuration has occurred, SNMP traps are sent from the HA cluster nodes to notify the management station. An MC/ServiceGuard MIB and SNMP subagent have been designed to provide this event notification via traps. Traps provide more timely notification of mission-critical events than periodic polling. The traps sent by the MC/ServiceGuard subagents are the crux of the HA Cluster management solution for monitoring and event notification.

The MC/ServiceGuard MIB defines the managed objects and the traps that the SNMP subagent services. The MIB

contains configuration and status information for the cluster, the nodes and packages configured for the cluster, and many of the components that make up the cluster, including movable IP addresses configured for the packages and network interfaces configured for the cluster. In addition to sending traps, the SNMP subagent provides the interface to the managed objects by responding to management server requests for HA cluster configuration and status information defined in the MIB.

Event notification under NNM is provided through the Event Browser. These SNMP traps, or events, are logged and visible through the NNM Event Browser. The Event Browser provides notification as well as a history of the events occurring on an HA cluster. The history of events relating to the cluster can be used as a starting point for troubleshooting the problem and restoring the availability of the cluster. Through the Event Browser, system managers can prioritize and filter events. System managers can also customize events; for example, they may want to configure pop-up notifications for package failover events, or configure automatic actions.

The NNM component of HP ClusterView provides basic event notification; however, HP OpenView IT/Operations (ITO) provides more flexible and sophisticated event management. Like NNM, ITO receives messages from SNMP traps. In addition, ITO can receive messages from other sources, such as log file monitors. ITO messages are stored in a database and viewed in the ITO Message Browser. The Message Browser can be easily configured to show a particular subset of events or to view message history. ITO can send different messages to different system managers, depend-

ing on their ITO configuration. Integrating HP ClusterView with ITO allows system managers to use the more comprehensive capabilities of ITO to monitor events.

MC/ServiceGuard SNMP events are used to report the health of managed objects. In an ITO environment, HP ClusterView will inform the system manager of noteworthy events. Under normal conditions, MC/ServiceGuard expects certain nodes to be active members of a cluster and certain packages to be running on specific nodes. Failovers occur for various reasons; the failover attempts are expected to succeed. ITO uses message templates to assign a severity to each kind of event it receives and to display a message in the Message Browser if appropriate. HP ClusterView provides a message template that recognizes all of the SNMP traps generated by the MC/ServiceGuard SNMP subagent.

In ITO, color provides quick visual identification of the severity of a problem. A Managed Nodes window shows all the systems for which a system manager is responsible. The color of a managed node changes to reflect the severity of any outstanding messages relating to that node. The severity for HP ClusterView events in ITO is based on the system manager intervention required. Normal events are usually triggered or followed by other events, or they are caused by normal user-initiated actions. In most cases, critical events require troubleshooting.

Cluster Troubleshooting

Once the system manager knows failures have occurred in an HA environment, it is important to fix the problems and restore high-availability. Messages can be configured to provide detailed

instructions and automatic and operator-initiated actions. Thus, ITO provides a framework from which to help the system manager effectively maintain a highly available clustered environment.

When troubleshooting a single system, a system manager's first priority is to get the system or application working. With high-availability products, such as MC/ServiceGuard, the system manager will first monitor MC/ServiceGuard to ensure that the package failover succeeds. Determining the root cause is of secondary importance. The system manager must think at a cluster level first and then the node level within the cluster.

The root problem analysis can be a time-consuming investigation. It requires thorough evaluation of all of the available information. System managers need guidance and assistance in problem solving. HP ClusterView integrates with ITO to provide troubleshooting assistance by providing message details, event-specific instructions, automatic actions, and operator-initiated actions for each ITO message related to MC/ServiceGuard. It also provides troubleshooting tools at the system manager's fingertips as icons in an Application Bank. The goal is to reduce the time spent solving problems and to direct system managers to appropriate corrective actions. The following paragraphs give more details about the troubleshooting assistance provided in each area.

When a problem occurs in a cluster environment, cluster messages will be sent to the management station. During the problem identification phase, the system manager can view the message details to determine the nature of the problem. These details include the time the message was generated, the message group (category), the severity of the message,

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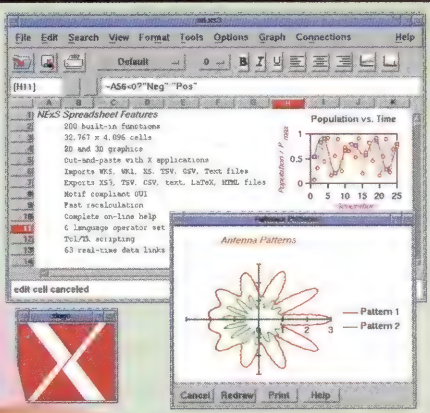
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and the source of the message. Details also include information about the cluster, node, package, and application related to the event. Troubleshooting instructions and some troubleshooting actions are also available for each event. The troubleshooting instructions explain the possible conditions and causes for an event as well as detailed troubleshooting steps.

For example, when a package (application) fails, the message informs the system manager that this package has stopped running on a certain node. The instructions explain that this event might occur when the package is stopped by a user's request through a command or due to a node failure, a LAN card failure, or a service failure. A service is any resource a package needs to function correctly, for example, a database daemon. The instructions will tell the system manager to view the current status of the cluster and see if the package is starting or running on another node by looking at the HP ClusterView submap. During a package failover, the worst thing the system manager can do is attempt a command that will conflict or interfere with the MC/ServiceGuard process that is trying to move the package. For example, a system manager entering a halt package command while a package is attempting to start on a new node could cause problems and result in a loss of high availability. The instructions in HP ClusterView should guide the system managers to do the right things.

At the next step the instructions might suggest checking the output of the automatic actions. Upon receipt of the message, the automatic action collects the last 30 entries in the syslog file and the package log file. Viewing this information provides further troubleshooting assistance. In the case of the

example, the log file might indicate that the package failed because of a LAN card failure. (The LAN card failure would also generate a message of its own.) The instructions might tell the system manager to launch one of the message-specific actions to find out which subnet is configured for the package or if the package can be switched back to the node. The instructions also indicate how to restart the package on the original node after the LAN card problem has been resolved, for example, by using tools provided by HP ClusterView in the Application Bank to switch the package back to its original node.

In general, actions defined by HP ClusterView will collect information to enable the system manager to determine the root cause of the problem; it is assumed that MC/ServiceGuard has already taken recovery actions. Once the problem has been identified, the system manager can use tools in the Application Bank to make changes and recover from the problem in the cluster environment.

Conclusion

In order to manage an HA cluster environment effectively, system managers need to be able to view the current status of the cluster, monitor changes, and fix problems before they result in application downtime. HP ClusterView provides centralized monitoring for clusters, nodes, and packages.

HP ClusterView makes NNM cluster-aware. MC/ServiceGuard clusters are automatically discovered and monitored. System managers can track cluster events in the Event Browser. In an ITO environment, HP ClusterView takes advantage of enhanced event management capabilities. Cluster-related messages in ITO provide instructions, actions, and

applications to assist the system manager in determining the root cause of a problem and fixing it. The distributed intelligence of HP ClusterView provides a good framework for managing high-availability clusters. In particular, it helps a system manager quickly pinpoint problems and take steps to resolve them.

The additional complexity resulting from redundant hardware and software must be taken into account. System managers must be able to view the current status of the cluster, receive notification of changes in the cluster, and effectively troubleshoot problems. If not, the availability of mission-critical applications may be at risk. By understanding and addressing the issues unique to managing high-availability clusters, system managers can provide the level of support essential for highly available systems. ■

Sherri Norwood, Julie Symons, and Mily Tsou work for Hewlett-Packard in Cupertino, California. They are software design engineers in the General Systems Division General Systems Solutions Lab and contributed to the development of the HP ClusterView product.

Norwood received her B.S. in Computer Science at the University of Colorado, Boulder and has been at HP for 5 years. Symons received her B.A. in Applied Math from the University of California at Berkeley and has been at HP for 9 years. Tsou received her M.S. in computer Science at the University of Massachusetts at Lowell and has been at HP for 11 years.

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Software Review

by Greg Cagle

THE SUBJECT OF THIS review is Netscape Mail, which is one part of Netscape Navigator. The standard Netscape product also includes a Usenet News reader and a Web browser. The Netscape Gold product also includes an HTML editor. Netscape is available for all the popular UNIX systems, as well as Macintosh and Wintel platforms. The version reviewed here is 3.01, running on an HP 715/80 at HP-UX 10.20 with the CDE desktop.

Netscape Mail

Features

X/Motif Interface

Netscape Mail features an interface that is somewhat different from other mailers I've used. It's divided into three panes: one pane contains the mail folders, one the header summaries of the current folder, and one the contents of the current message (*Figure 1*). The layout is configurable in that you can stack the three panes vertically or split the folder and header panes horizontally or vertically with the message display pane. The interface is intuitive; you navigate by

clicking on the folder you want, then clicking on the message you want to select. The toolbar allows you to execute the basic mail functions of:

- getting new mail from the server
- deleting the current message
- composing a message
- replying to a message
- replying to all addressees of a message
- forwarding a message
- accessing the previous or next message in a thread
- printing a message
- stopping whatever is going on

The toolbar is *not* configurable by ordinary humans. One very nice feature of Netscape Mail is optional message threading, which allows you to follow message threads easily in a folder. You can get somewhat the same effect by sorting by subject, but the hierarchy isn't as clear.

Other functions are accessed by menus:

- The "file" menu supplements the toolbar with "new folder" and "add folder" functions (more about them later) as well as "empty trash," "save as," and folder compression functions. I find it a bit irritating that Netscape assumes that any file you want to save should be an HTML file; more than likely that won't be true in e-mail. Interestingly enough, this menu is where the "new message" command lives, instead of in the "message" menu. Hmm.
- The "edit" menu has the usual things one would expect, primarily selection functions and searching functions.
- The "view" menu allows you to view the current message in different ways.

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For example, you can choose to view attachments inline or as links. As a point of interface design, you have to wonder why they put some option selections here and not in the Options menu.

- The “message” menu contains messaging functions. One nice feature is the ability to automatically add the current message addressees to the Address Book. The “move” and “copy” menu items are similar to Eudora in that they access a cascading menu that parallels the folder tree structure. Too bad the whole interface doesn’t support nested folders this well.
- The “go” menu allows you to navigate within the current folder.
- The “options” menu allows customization (see the Customization section below).
- The “window” menu allows you to get to the Address Book, access your Web bookmarks (!), or start the Usenet news reader.

The window of most importance after the primary is the Composition window (Figure 2). As you can see, the default signature file (specified in the Options menu) is automatically inserted into the composition window. The composition window toolbar allows you to send the message, optionally quote the message being replied to, attach a file, and access the Address Book. Menu selections allow you to save and print messages, perform rudimentary editing functions, select the headers available for input, and choose immediate or deferred delivery. Again, this is a funny place for this type of option, which would be more logically placed in the main preferences dialogue. Choosing deferred delivery allows you

FIGURE 1

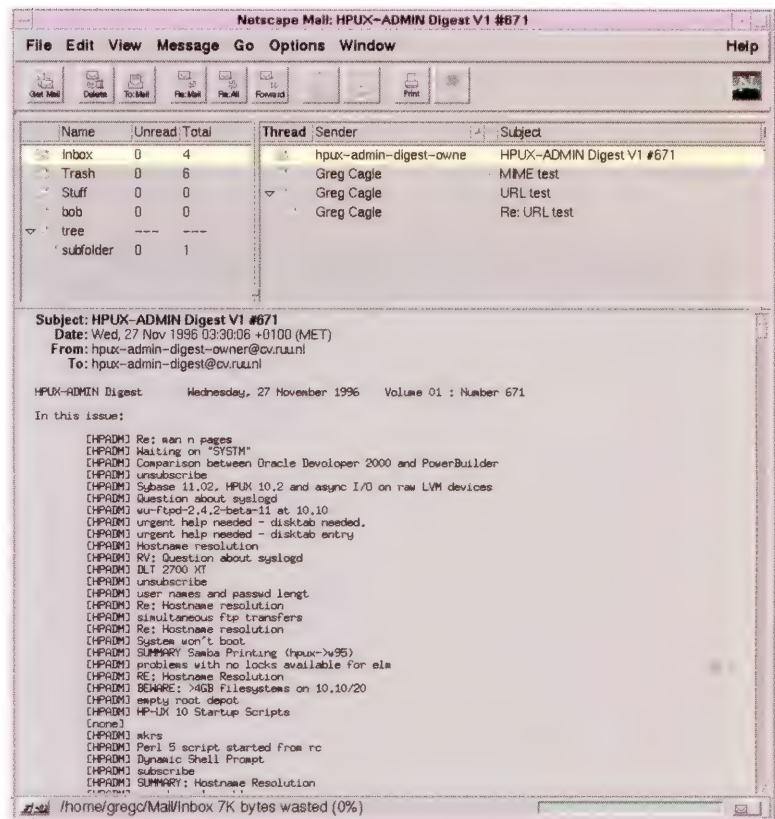


FIGURE 2

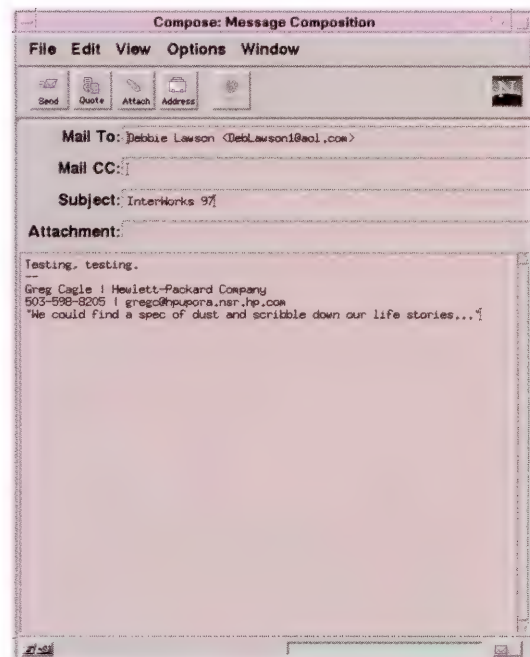
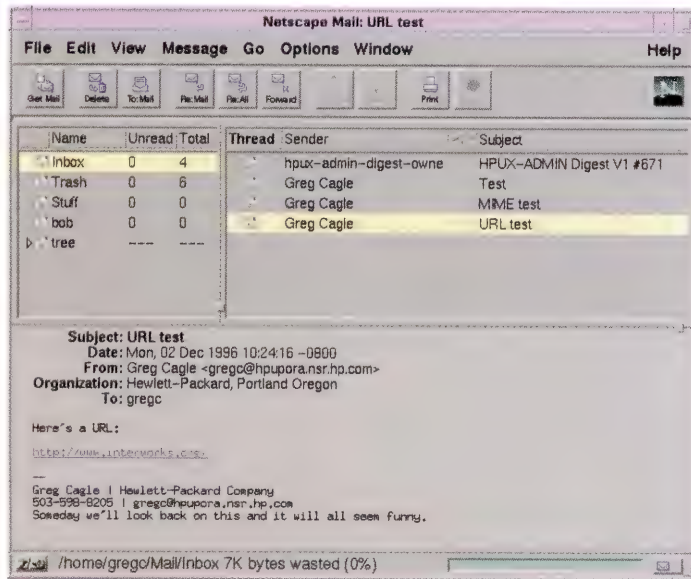


FIGURE 3



to queue messages in the "Outbox" and then send them all at once. This is convenient when using dialup connections and is common in PC-based mailers.

Integration with Usenet and Web Functions

Netscape really shines in the way it integrates the mail, news, and Web functions. Embedded URLs are highlighted and underlined just as they are on the Web (Figure 3) and the browser is automatically invoked when you click on them. Very convenient.

MIME Capability

Netscape Mail is MIME-capable in that it can display MIME attachments in the message or as links (Figure 4). The Options menu allows association of file types with "helper" programs; in this case, I've configured Netscape to use *xv* to display TIFF files. Netscape uses base64 encoding by default, and the encoding and decoding is transparent to the user. On the input side, though, Netscape does not allow rich text composition as Ishmail does.

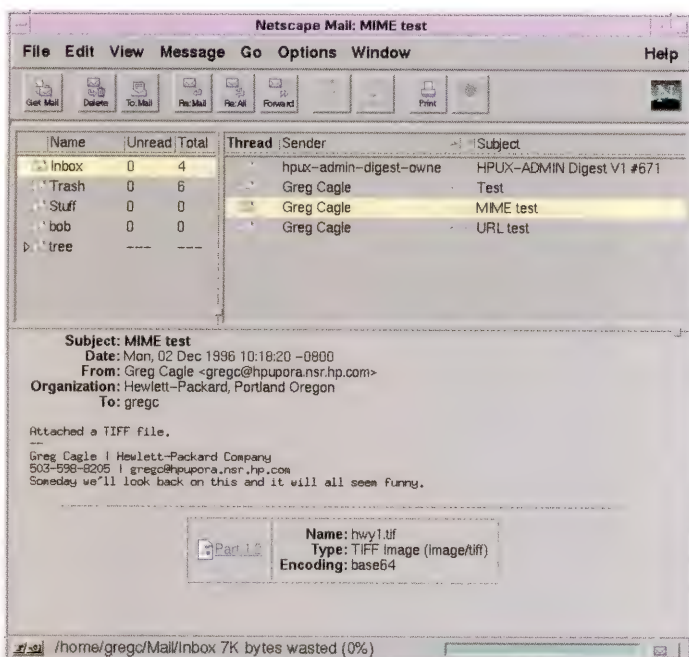
Customization

Netscape Mail is customizable, after a fashion. Power users will most likely be disappointed, though. A quick tour of possible customizations in the Options menu of interest:

- fixed versus variable width font
- font selection
- helper applications
- quoted text styles
- main window pane layout
- copy outgoing messages to self or others
- automatically quote replies
- POP3 vs. movemail (see below)

Continued on Page 48

FIGURE 4



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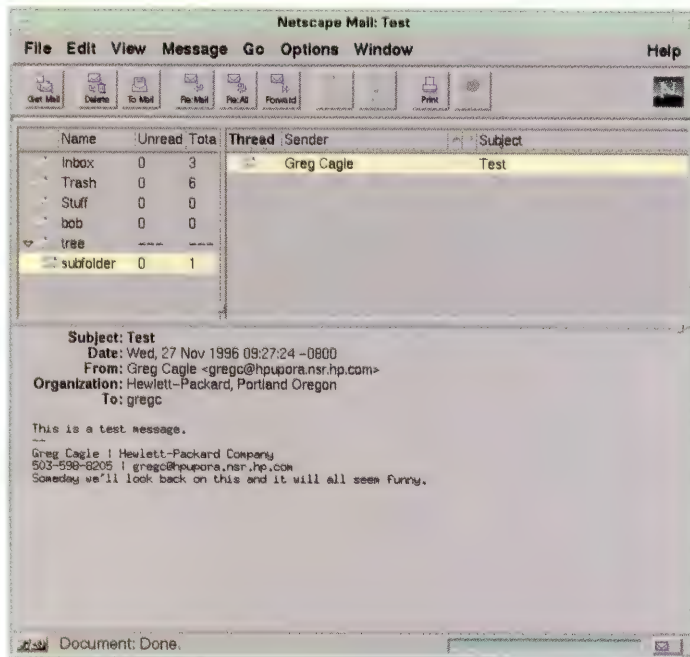
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FIGURE 5



- reply address
- signature file
- threading on/off
- default sorting
- header display (all versus "normal" versus "brief")

And that's it. It's pretty limiting compared to other mailers. Some other things can be configured with X resources, but it's nontrivial. The comments in the supplied X *app-defaults* file, by the way, are moderately amusing, if a little arrogant.

Searching and Sorting

Sorting of messages can be accomplished in the main window by merely clicking on the header of the column you wish to sort by—thread, sender, sub-

ject, or date. You can also use the View/Sort menu to sort by message number and to change the sort to an ascending order.

You can search using the View/Find menu; it brings up a dialogue box allowing you to input a string to search for. Searching is limited to a single folder at a time; you can search just the headers, or the message bodies, and you can reverse the order and toggle case sensitivity. Regular expression searching, however, is not supported.

Folder Management

Netscape's folder management is, in my opinion, seriously flawed; it does not allow you to create folders in a tree structure. Instead, you must go *outside* the program and create directories in

the mail directory. Once you create them, they show up in the Folder pane of the main window (Figure 5). But it's needlessly painful. Once the tree structure is in place, you can create folders within the tree using relative pathnames in the "New Folder" dialogue, but again it's needlessly painful. You can, though, manage the folders within the folder window using drag and drop, which is very nice. I've heard reports, also, that nested folders are not compressed or indexed correctly. And, Netscape won't allow you to have more than one folder open at once.

Address Book

The Netscape mail address book (Figure 6) is functional for everything I use an address book for. You can double click on an entry and bring up a composition window addressed to that entry, and you can also drag an entry onto an open composition window and it will be added to the To: header. You can manage the entries within the address book using drag and drop also, and have multiple folders within the address book. You can import other HTML address books, but not *.mailrc* or *elm* formats, which can be a barrier to migration.

Online Web-based Help

As noted below in the documentation section, the online help is really on Netscape's Web site and therefore is subject to all of the issues surrounding that. There is no context sensitivity in the help implementation; it's basically just a menu with some hyperlinks to Netscape's Web site. Only the main window has any way to access help; no other windows have a help button or menu. In today's world, that's way behind the curve.

Continued on Page 50

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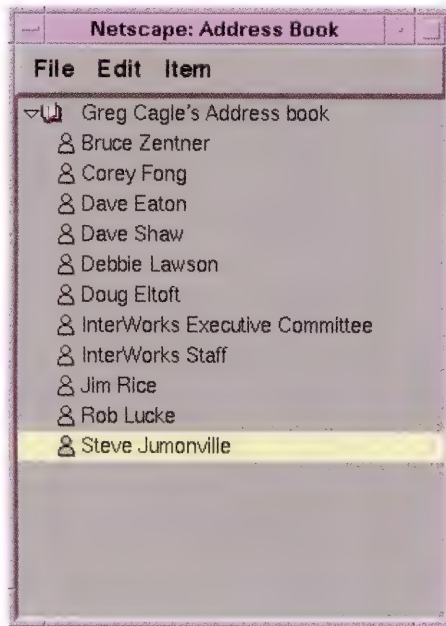
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FIGURE 6



Licensing

Netscape is not licensed at run-time, but is a licensed product and is no longer free.

Installation

Installation of Netscape is fairly trivial; it is supplied from Netscape's Web site as a tar format file compressed with *gzip*. The tar file contains the Netscape binary, a README file, the license file, an X resource file, a file called *XKeysymDB* that may be needed on Sun systems for Motif keyboard support, a Java applet support file called *java_301*, a default plugin file configured as a shared library, and a program called *movemail*. Installation consists of copying the binary, the Java file, and the plugin file to their proper locations. The binary can live anywhere; the Java file must live in one of four specified direc-

tories, and the plugin file must live in one of two specified directories. As noted previously, an X resource *app-defaults* file is provided, but you shouldn't need it.

The *movemail* program is intended to overcome the issues concerning locking a user's mail spool file. It is a GNU utility, and is shipped in both source and binary forms. If you use a POP3 server, then Netscape can be configured to use that and you won't need *movemail*. It is important that you *not* configure Netscape to treat the incoming mail spool file as a folder, because it won't lock it and you will be wide open for mail spool corruption. Netscape includes *movemail* in the Navigator itself, but the Netscape binary may not have enough permissions to do what it needs to do in the mail spool directory. In that case, you can use the external *movemail* and give it the permissions you

need and localize the administration impact. On HP-UX 10, Netscape recommends setting the "sticky" bit (permission 01777) on the mail spool directory, and then configuring *movemail* with *setgid* to the "mail" group. *movemail* locking is done with the "dot locking" protocol, which coordinates access to the mail spool file by writing a file in the mail spool directory with a *.lock* extension.

Usability

Netscape will read and write the standard folder format used by the majority of other MUAs with no problems. It will not deal with mh-style folders. Be aware, also, that Netscape uses folder indexing, which has its own set of compatibility issues. Also, the Netscape address book is stored as an HTML file, which is incompatible with other mailers.

Reliability

Early versions of Netscape's mail agent were unreliable, but 3.01 appears to be quite stable.

Performance

The Netscape mailer performs at least as well as other mailers I've used. Its use of index files speeds up folder access significantly over some other mailers.

Supportability

Netscape is dynamically linked with the system, X11, and Motif shared libraries and is therefore vulnerable to the effects of version skew on those libraries. Even with that, the binary is around 5 MB. Given the frequency of Netscape's releases, this could be an issue.

Documentation

I downloaded Netscape Navigator from Netscape's Web site; no hardcopy

documentation is included, as you might expect. In this mode, the only documentation available is on Netscape's Web site, and assumes Web access. The hardcopy manual is available for an extra \$10 from Netscape or in any technical book store. I did not review the hardcopy manual, but found the online documentation to be pretty sparse. It's apparently just a quick summary of the menu items and buttons, and isn't hyperlinked or even organized very well.

Summary

Netscape's strength is in the integration of the mail, news, and browsing functions in a single tool with strong multimedia capabilities. But even a moderately sophisticated mail user may become frustrated with the lack of features. It seems to me that the mail and news portions of the Navigator are not areas of focus for Netscape and rather exist only to support the primary Web browsing function of the tool. I suppose this shouldn't be surprising, but I was hoping for a bit more, especially given Netscape's multiple platform support. The online documentation and help are substandard. ■

Greg Cagle is a technical consultant with HP's Professional Services Organization, specializing in HP-UX and workstations. In his spare time he is a member of the Executive Committee of InterWorks, the Technical Users Forum of Interex. He can be reached at (503) 598-8205 or gregc@hpupora.nsr.hp.com.

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CIRCLE 18 ON READER SERVICE CARD



by David L. Totsch

Queue-ry

ON SEVERAL OCCASIONS I have had the opportunity to observe personnel at an HP-UX installation pondering the need for software that accepts multiple requests and processes them in a sequential fashion. Such software is usually needed in conjunction with fax capabilities, Trouble Ticket systems, secure report query, automated paging systems, and other situations where a queue mechanism would help manage a process or peripheral. Upon agreeing to the requirements, everyone usually initiates his own search for some sort of queueing software. I usually find the process amusing since HP-UX already has a pretty good queueing system: the line print scheduler. OK, it is far from perfect, but it exists and is reasonably easy to understand and implement.

Using the print scheduler to control a queue other than a print queue is easy because the working component to each queue is a shell script. The task is further simplified because the shell script is expected to perform in a predictable manner (you can even begin with a copy of a working printer model script). Basically, if you can write a shell script to perform a task the way the queue should do it, you have the components you need to have the print scheduler queue the requests.

Before you implement your new queue as a printer, make sure the following housekeeping tasks have been addressed:

- input validation
- error checking and reporting
- logging

When validating input, keep in mind that command-line arguments can be easily checked with case statements. It

is certainly less difficult to gather and validate command-line arguments instead of parsing them out of the file to be printed. Even though command-line arguments will be simpler to check, there will always be errors; be sure to send e-mail to the user and possibly to the software administrator. When an error indicates that the next request will also fail, the print queue can be disabled by issuing a non-zero exit status. When implementing your first queue mechanism through the print facility, you will want to have the process log each step that it takes. Once it is working, pare back to logging the success or failure of each request.

After you have a queue in production, remember that the print scheduler allows the creation of printer classes (you can call them queue classes). Now you can have more than one task running simultaneously (but no more than the number of queues in the class). Also remember that, since this is a print scheduler mechanism, other hosts can use your queue mechanism via rlp services. Setting up a print queue to perform a task other than printing may seem strange, but that is part of UNIX elegance—you are not restricted to using any single service for its intended purpose! ■

David L. Totsch is a Technical Consultant for Premier Systems Integrators, Inc. in Charlotte, North Carolina. His specialty is HP-UX system administration and he enjoys training others to do the same. He can be reached at (704) 522-6088 or totsch@rdbc.rdbc.com.

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CIRCLE 72 ON READER SERVICE CARD

by Larry Headlund

Hello *wall*

SOME SIMPLE AND USEFUL UNIX commands don't have analogues in the X world. One that came to my attention recently is the UNIX *wall* command. Now, *wall* is a command to broadcast to the known world, or at least to all terminals logged in to a particular machine, a message of good cheer or more commonly a message of warning. Its use is restricted on most systems to root by permissions and the command itself is in the directory */etc*. Those messages from the system administrator giving you the glad news that the system will shortly shut down usually arrive courtesy of *wall*.

The Problems with *wall* in an X Environment

The *wall* command works by writing to all terminals logged in. That is, it writes to everything that would appear in the output of a *who* command. This includes instances of the xterm, hpterm, or dtterm programs of any other terminal emulator. So at first glance it seems we don't have a problem at all: just let *wall* do its thing. Unfortunately, it is not as simple as that.

First, not everyone connected will be running (x) (hp) (dt)term. While it is true that a terminal emulator is still the most popular X application, which says something about GUI interfaces in general, it is not universal. Some users connected to a machine may not be running a terminal emulator at the time you want to send them a message.

Second, even if they are running a terminal program, they may not notice a message written to that terminal program. They may be enraptured by the application they are running and not see something written to any terminal program. The terminal programs may be iconized with any changes to them hidden.

Thirdly, aesthetic considerations call out for something flashier than a display on a xterm program. This would not be sufficient to justify the work if all other considerations were met, but a little flash in a necessary job never hurts.

The Motif Message

A program to display a message is usually the first exercise in any programming language, the canonical *hello, world* program. We want something a little more sophisticated than that, but not much. We need to pop up a variable message on any given display and have it disappear on the user's command. Presented that way, the program almost writes itself. We need a simple MessageBox widget which exits when the Ok button is pushed. Any well-behaved X program will respond to the *-display* option to determine which X terminal or X terminal surrogate the program will display on. (An X program becomes a well-behaved X program by calling the Xt function *XtInitialize()* or *XtAppInitialize()*.) The same well-behaved program will accept the setting of resources, most particularly the method we want to display, from the command line.

It will surprise no long-time readers of this column that I wrote the program to do this with the Widget Control Language (Wcl), doing everything in a resource file. The resource file I came up with is in *Listing 1*. If your inclination doesn't run to Wcl, you could write a similar program in Tcl/Tk, dtksh, or even a straight C or C++ program.

With Wcl I have a generic interpreter called *Mri*. To display a message on display

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named *red* with message "System going down in 10 minutes.\nLog off now!" I would issue the command:

```
Mri -name motif-message -display red \
    -xrm "*messageString: System going down in 10 minutes\nLog off now!"
```

The *-name motif-message* tells which resource file to read. The *-display red* says to display on machine *red*. The *-xrm* combined with "**messageString:*" sets the message to be displayed.

The *mwall* Script

With great originality, I have named the Motif version of the *wall* command *mwall*. The Korn shell script takes a single argument of the message to be displayed. It will launch the *motif-message* program with the given message on every applicable display. The text of this script is given in *Listing 2*.

The *getlistofdisplays* Program

Alert readers will see that I have the list of displays from a *getlistofdisplays* program. Surprisingly, there is no simple function or program that gives you a list of the displays active from a given machine. Yet that is what we need. We will have to do some detective work.

If you know which boxes are permitted, you can make a list and just output it for *getlistofdisplays*. An example of such a program is given in *Listing 3*. This approach has some serious drawbacks. First, this file would have to be updated independently every time the administrator permitted a new connection. Obviously, that could

create inconsistencies—either connections permitted but not reflected in the program or obsolete connections having a shadow existence in *getlistofdisplays* only. Note also that this would be a list of possible connections, not active connections. If you launch an X program, any X program, with a display option and that display is not available, the X program will hang waiting for a connection. This is not serious if the message is telling users that the system is shutting down and the system will shut down, but can cause problems with more mundane messages. For X11R3 and earlier, if you wanted a list of all possible X connections to a machine, you could look in */usr/vue/config/Xservers*. Any box allowed X access would have an entry. This changed with X11R4 and above so that more promiscuous connections were permitted. If you are maintaining a backward-compatible Xserver file, you could parse the file and get a list of displays. This eliminates the

LISTING 1 *Motif-Message Resource File*

```
! Public
Motif-message.title: Motif Wall
*messageString:      Default Message

! Private
Motif-message.wcChildren: box

*box.wcClassName:      XmMessageBox
*box.dialogType:        DIALOG_INFORMATION
*box.okCallback:        WcExitCB(),
```

LISTING 2 *mwall Script*

```
#!/bin/ksh

#      mwall: Motif wall program
#      Display message on all connected displays
#      Usage: mwall message

message=$1
set -A displays "`getlistofdisplays`"
for display in $displays
do
    Mri -name motif-message \
        -xrm "*messageString: $message" \
        -display $display &
done
```

LISTING 3 *getlistofdisplays for a fixed list*

```
#!/bin/ksh
# getlistofdisplays for a fixed list.
# Note this program must be updated manually!

cat \
red:0
blue:0 \
yellow:0
```

LISTING 4 *getlistofdisplays from Xservers File*

```
#!/bin/ksh
# getlistofdisplays from Xservers file.

echo :0 # workstation home screen
cat /usr/vue/config/Xservers | \
grep -v '\#' | \
awk '{print $1}'
```

problem of a totally separate file to maintain, but you could not expect this somewhat obsolete file to be maintained indefinitely. You would still have the problems of nonactive connections being returned. An example of the kind of script that would use Xservers is given in *Listing 4*.

What we need is something more dynamic, something that tells us what is actively connected. Why not use the X program itself? That is, any X terminal or workstation running X has a copy of */usr/bin/X11/X* running on it with an argument of the display. Bingo, a list of displays that is up to date? *Listing 5* shows how the output of a *ps -ef* command could be parsed to give a list of displays. There is a fly in this ointment however. A machine could be running X programs from your machine without running */usr/bin/X11/X*. A PC running an X server with the user running a particular program, perhaps.

There is a way around this problem! A helpful suggestion from Frank Hofmann (*hofmann@wpax01.physik.uni-wuerzburg.de*) led me to investigate the output of *netstat*. He pointed out that X always uses connections numbered *.6000 +x, with x being the display number. Some fancy parsing, as

LISTING 5 *getlistofdisplays from ps*

```
#!/bin/ksh
# getlistofdisplays from ps -ef command output.

ps -ef |grep '/usr/bin/X11/X ' | \
grep -v grep | \
awk '{print $9}'
```

LISTING 6 *getlistofdisplays from netstat*

```
#!/bin/ksh
# getlistofdisplays from netstat output.

cat foo |grep '\.60' | awk '{print $5}' |sort -u | \
awk -F. '{
    if (NF>2) {
        for(j=1;j<NF-1;++j){
            printf("%s.", $j)
        }
        printf("%s:%d\n", $(NF-1), ($(NF) - 6000))
    }
}'
```

indicated in *Listing 6*, gives us all the connections. This particular script will give you problems if some of your subdomains are numbered with 60nn.

Well, not quite all. There could still be problems if you required authentication or if X were running over some other transport mechanism, such as ssh, but I think we have covered everything but cases I will define as perverse.

Suggestions appreciated. ■

Larry Headlund is president of Mathematical Engineering, Inc. and has been involved with commercial UNIX since 1982 and with X since 1988. He can be reached at *lmh@world.std.com* or (617) 242-7741.

by Joseph Berry

I GOOFED BIG TIME. In my previous column, I mentioned having been told by someone about a UNIX graphics program that was better than *xpaint*, a program I had described in an earlier column. I said that I had lost the gentleman's e-mail but "guessed" that the program was *xfig*. So much for my detective abilities. I found the misplaced e-mail. Alan Riley from Stata Corporation in Texas says, "Check out <http://www.xcf.berkeley.edu/~gimp>—it is rapidly becoming known as the free PhotoShop on UNIX." I discuss this program below.

I have succumbed to the Java rage. I had been learning object-oriented C++ as a part-time profession, thinking all the while that something must be wrong with me. Why was I having such a difficult time learning this language? I asked a former co-worker, a C++ guru, what he thought about Java—should I continue with C++ or switch, as I had wanted to do? He heartily agreed with my suggestion of switching to Java. I hope to include some useful Java software in this column on a regular basis.

misc

***gimp* (Version 0.54.1)**

gimp is the General Image Manipulation Program. *gimp* is designed to provide an interface to a variety of image editing operations. Image viewing includes GIF, JPEG, TIFF, and XPM support. Image editing includes selection tools (rectangle, fuzzy, bezier, etc.), transformation tools (rotation, scaling, etc.), and painting tools (bucket, blending, airbrush, etc.). Other features include color operations such as addition and composition and special effects filters. A very nice feature of the program is

multiple undos and redos.

gimp has been tested on Linux, Solaris, HP-UX, and SGI IRIX systems. The program requires Motif. The home Web page, including binaries and sources for *gimp*, is

<http://www.xcf.berkeley.edu/~gimp>.

alt.sources

***pad2ps* (Version 3.1)**

Seiichi Yoshida from the Waseda University, Japan, has contributed *pad2ps*, a tool that draws algorithms and program sources using PAD sources.

According to Yoshida's Web page, "PAD, which stands for Problem Analysis Diagram, is a way to illustrate the flow or structure of programs. PAD is similar to flowchart, but they are not quite the same. The flowchart is good for charting programs written in languages like BASIC, a language with the GOTO statement. To chart structured programs, like ones written in C, however, PAD is much handier than flowchart."

This program can be used to analyze the structure of someone's program (typically not your own). I once needed a program similar to this but had difficulty finding anything that didn't cost a lot of money.

For more information or to get the latest version, see his Web page at

<http://www.info.waseda.ac.jp/muraoka/members/seiichi/project/pad2ps.html>.

dir2html

Daniel Dean (deand@dmagpub.dma.org) submitted a nice little utility that creates an HTML-formatted output file of a directory. This C language program is perfect for intranets where you need to

browse through a large directory structure. The source was originally posted in September, 1996. If you cannot find it on the Internet (even with Deja News), drop me a line and I'll send you a copy. It's not a large program.

comp.infosystems.www.announce

Habanero (Version 1.0, beta 2)

The National Center for Supercomputing Applications (NCSA) at the University of Illinois at Urbana-Champaign is the developer of the original Web browser, Mosaic. Many people also use their Web server program, httpd. NCSA has just released their next generation tool, Habanero.

As their Web page says, "Habanero is a framework for sharing Java objects with colleagues distributed around the Internet. Included, or planned, are all the networking facilities, routing, arbitration, and synchronization mechanisms necessary to accomplish the sharing of state data and key events between collaborators' copies of a software tool." Habanero is a set of Java-based collaborative tools including a development API. A number of existing tools and demos are included in the free package, including Audio Chat (Solaris Only), a Whiteboard, a Voting tool, a Text Editor, Java Graph, Chat, Visible Human, Today's Weather, and a Geometry tool.

The software and documentation are available from the Web page at <http://www.ncsa.uiuc.edu/SDG/Software/Habanero/>.

Free Java Applets

In keeping with my interest in Java-related code, I was happy to find Menno Zweistra's (menno@cycloop.nl)

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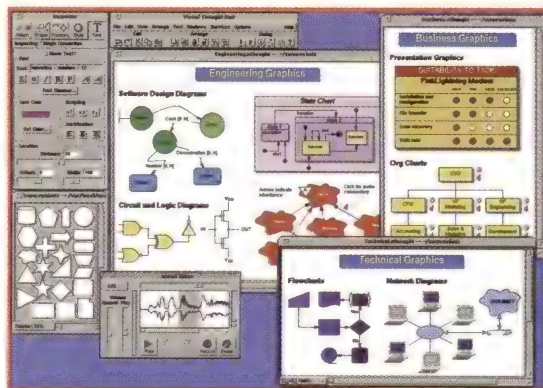
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CIRCLE 37 ON READER SERVICE CARD

Web site with four free applets ready to be downloaded. Menno's Web page is <http://www.euronet.nl/~cycloop/>. It includes the following applets:

1. WebMailer. A Java applet that sends e-mail directly from a WWW page.
2. Bouncer. A Java applet that displays images and text floating around and bouncing. The images and text can contain links to jump to other places. This applet and the previous one were awarded "Top 25% Web Applet" by JARS.
3. Button. A Java applet that mimics a 3D button. This "button" can contain text or an image. It jumps to a specified link.
4. TextZoom. A Java applet that displays text with a zooming effect. Full color, speed, and font control.

The Java source code is not distributed. You can download the .class files, which will work on all platforms. The author requests that you register with him and that you give him a credit (plus link to his home page) on your Web page.

wwwstat (version 2.0)

wwwstat is a very useful utility that generates access statistics to your Web page. The Perl program reads a sequence of httpd Common Logfile Format access_log files and/or prior *wwwstat* output summary files and generates summary statistics files in an HTML format so you can use your browser to view your access statistics. The program takes only a minute or two to set up, although there are a large number of options you may wish to read through.

The software is available via any-

mous ftp from [www.ics.uci.edu](http://www.ics.uci.edu/pub/Websoft/wwwstat/wwwstat-2.0.tar.gz) as [/pub/Websoft/wwwstat/wwwstat-2.0.tar.gz](http://pub/Websoft/wwwstat/wwwstat-2.0.tar.gz).

comp.lang.java.programmer

JDK (version 1.0.2)

Yes, a free version of the Java Development Kit is available. The site <http://www.apl.jhu.edu/~hall/java/> is an excellent resource for Java-related material. Tutorials, source code, and all sorts of interesting things can be found here. In addition, versions of the Java Development Kit for all known available platforms are listed, including Win95, WinNT, MacOS, Win 3.1 (alpha release), SGI/Irix, Solaris, HP-UX (10.01, 9.07), Linux, OS/2, DEC Alpha, and a few others.

comp.lang.perl.announce

GraphMaker (version 1.1)

In the previous issue of *hp-ux/usr* magazine, I described two graphics packages that can be used to create graphs from data for use in Web pages. Fabrizio Pivari, from Italy, has contributed one more graphics package. His Web page presents some sample output. For simple data displays this package may be a quicker solution than those I had previously mentioned. Visit his Web page at <http://www.agip.it/~pivari/graphmaker.html>. Check carefully to ensure that you are getting the latest version. Mr. Pivari released Version 1.1 only about a month or two after Version 1.0. Something new may already be available.

comp.sources.misc

libftp

This package was originally published on Usenet as eight files in volume 41,

issue 34-38. *Libftp* is a simple C interface library to the ftp protocol, essentially allowing you to do programmatic ftp access (without resorting to executing the ftp program as a child process).

The software comes with an example, a PostScript-ready manual, and man pages. The library was written by Oleg Orel from Protvino, Russia. Compiling and running the library on my system was a trivial matter.

comp.sys.hp.hpux

ij-ppp (Version 0.94)

PPP (Point-to-Point Protocol) is a protocol for exchanging IP data (TCP/IP and UDP/IP) over a serial line. To connect a computer to an Internet service provider frequently requires having PPP software running on a system on your network. One can use a PC as a PPP/router or a Sun Sparc system as the PPP converter, since Sun supplies PPP software with its systems. According to Douglas Siebert (douglas-siebert@uiowa.edu), the only PPP software available for HP-UX was a port of *ij-ppp* 0.93 to HP-UX 9.x.

Taking things into his own hands, Siebert picked up a copy of *ij-ppp* 0.94beta2 (the latest he could find) and ported that version of *ij-ppp* to HP-UX 10.10, based on the *ij-ppp* port for HP-UX 9.x, with plenty of rewrites for the routing stuff, which completely changed with HP-UX 10.x.

As Siebert says, "I've been using it the past couple weeks (for dialin, I only tested dialout PPP over TCP/IP a tiny bit to see it works). Overall, it seems pretty solid; I haven't had any problems. This was compiled/tested on HP-UX 10.10; it may not build on HP-UX 10.20. I know it won't build on HP-UX 10.01 (but that's only because I relied on calls

like *usleep()* that HP-UX only added with 10.10. Armed with the port to HP-UX 9.x you can add these calls back in and get it to work, probably). Since I've seen requests for this now and then and know people would be interested, I've made my port available."

His port is available at *ftp.interworks.org* as file */pub/comp.hp/iiij-ppp0.94beta2.hpux10.tar.gz*. The software is not supported and Siebert does not want any e-mail sent to him about it (although I'm sure that any enhancements and/or fixes would be appreciated).

C-Kermit (Version 6.0)

C-Kermit, Version 6.0, is a major new release of the C-Kermit communications software for all the major UNIX platforms, including HP-UX. As stated in the announcement of this program, "C-Kermit is a combined serial and network communication software package offering terminal connection, file transfer, character-set translation, and automation through its powerful cross-platform script programming language." This package supports a ton of platforms, including DOS and Windows.

For a detailed overview of the product, look at the Web page at *http://www.columbia.edu/kermit/ck60.html*. The software is available for download either from this Web page or via anonymous ftp from *kermit.columbia.edu* in directory *kermit*.

Web Sites

http://www.utgn.net/~pambytes/

This site, owned and operated by Pam Gibson (*grafxnfo@ggfx.com*), houses over 1,000 free Web graphics, including buttons, textures, tiles, and backgrounds.

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http://www.DriversHQ.com

This is a very useful site to remember. The latest drivers for all your computer hardware can be found here, including BIOS updates, CD-ROM drivers, fax modems, etc.

http://www.ping.de/sites/maxwell/links/JAVA/java.html

This page is intended to provide serious information on Java for developers. Lots of software and documentation is available here. ■

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NT Accounts

IN A SECURITY SCENARIO I commonly find myself structuring on Windows NT, what I typically want to do is set up a directory of files to which only certain members of a team have access. For example, the development team wants several directories (e.g., `\src`) which only they can see or access. Perhaps a management team wants to document a legal case or do employee reviews and needs a secure subdirectory where files can be kept confidential. To build these structures, we need to understand the accounts, permissions, and groups that Windows NT supplies. Read on and I'll tell you how to set up this type of security.

Each user has, and logs onto, an account. (User accounts are created by using the User Manager for Domains program.) Remember that users log onto Windows NT using a logon name, password, and domain name. The domain is a collection of workstations and servers that has a centralized security database. The security database is a one-stop shopping place for access to all resources in the domain.

So, logging onto the domain means two things: first, that I have access to domain resources; and second, that I have a security identifier (SID). The SID is a unique value that is assigned to each account for identification purposes. It is the SID that Windows NT uses to determine who has access to what domain resources. A user is given or denied access to resources based upon the security given to the account and the access requirements placed upon the resource.

Under Windows NT, each resource (directory, file, device, printer, etc.) is an object, and is secured using a security descriptor (SD). The SD includes the owner's SID and, more impor-

tantly, has an access control list (ACL). The access control list is a list of access control entries (ACE). There are two ACEs of interest; one allows access to a particular user or group, and the other denies access to a particular user or group. The ACE also defines the permission type and SID of the user or group to whom the access is allowed or denied.

NT permissions are the access attributes of the resource. If the files system is NTFS, for example, files and directories have permissions such as No Access, Read, Change, Full Control, and Special Access. These permissions are combinations of specific tasks: Read, Execute, Write, Delete, Set Permission, and Take Ownership. This granularity of security is available only on an NTFS file system, not on FAT (DOS-compatible) or HPFS (OS/2-compatible).

Anyone familiar with HP-UX should find these permissions easy to understand. "Yeah," you say, "but HP-UX has permissions for owner, group, and everyone." Thank you for mentioning it. Windows NT also has a way to define the distinctions between the user, a group, and everyone.

Each resource (e.g., file) has an owner, as you noticed from the owner SID in the SD.

Windows NT also has the concept of groups. NT groups differ from HP-UX groups since an NT user may be a member of multiple groups at the same time. A group is a named collection of users that can be treated as an individual user. That includes giving access to resources to the group. When a group is granted access to the resource, every user in the group automatically is granted that access permission.

The two primary types of groups in

Windows NT, Local groups and Global groups, are very similar in many respects, but there is an important difference. Just as for users, both types of groups can be granted rights to access resources and to perform system administration tasks. But a Local group can have both user accounts and Global groups as members. A Global group can have neither a Local group nor another Global group as a member. A Local group cannot have other Local groups as members.

Several standard Local groups come predefined with Windows NT. The group *Administrators* contains the user Administrator, which was defined at installation time. The *Administrators* group is the equivalent of the super-user account. Members of this account can manage user accounts, groups, directories, files, and printers, and can install additional system software.

Other predefined groups include *Domain Users* (a Global group), *Server Operators*, *Print Operators*, *Backup Operators*, *Account Operators*, etc. As you can see, the predefined groups are designed to allocate various aspects of system administration and operation.

A third type of group, known as *Special* group, includes a predefined group named *Everyone*. All users are members of the group *Everyone* by default. It is not possible to remove any user from the *Everyone* group because Special groups cannot be administered; they are part of NT's operation. By default, all user files are available to *Everyone* unless the Administrator specifically alters that access. It is possible to change the resources to which *Everyone* has access.

The recommended way to use groups is to assign individual user accounts to a Global group, and then

include the Global group in the Local group. Assign the resources with access levels to the Local group. Therefore, Global groups can be thought of as groups of users, and Local groups can be thought of as groups of resources for Global groups.

OK, now we're ready to solve the original problem of allowing only certain users access to a particular set of files. We'll use the User Manager for Domains program to create the groups. What you want to do is create a Global group named *developers*. Include each project member's user account in the *developers* group. Notice that we don't use the Global group to assign any rights; just include user accounts. Now define a Local group named *lab*. Since *lab* is a Local group, it can include Global groups, and that's just what we do. Include the group *developers* as a member of *lab*.

Next we use the Explorer to set file permissions. From the Explorer, right-click the *\src* folder and select properties. Click on the Security tab, then click the Permissions button. The Permissions dialogue should now be displayed. Remove the *Everyone* group from the Permissions, and add the group *lab* with the Type of Access set to Full Control. If there are other groups listed that you don't want to have access to the folder, remove them. Check the box Replace Permissions on Subdirectories to have the permissions set on all directories below the *\src* directory. After clicking OK, the permissions will be set to restrict access to just the *developers*.

Security can be confusing if you don't watch what is going on. When you attempt to access a resource, you get the combined access of all groups your account is a member of, but the lowest set of permissions on a specific resource.

This can cause trouble if, for example, you didn't remove the *Everyone* group, but instead changed *Everyone* to have a permission of No Access. Since you are a member of *Everyone*, you'd get the lowest permission of No Access, and even though *lab* gave you access, you would not be able to access the file because *Everyone* denied access. ■

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by *Geff Blaha*

Q: There has been much concern of late regarding the year 2000 and how it affects operating systems and applications. How does the year 2000 affect HP-RT?

A: HP-RT is capable of handling the year 2000 without problems. The beginning of time for HP-RT is the first of January, 1970, at 00:00:00 AM. HP-RT can process 2^{31} seconds, allowing for a little over 68 years (including leap years) since 1970. Anything after this date/time will be recognized as “negative,” and will not accurately be maintained or represented.

Q: Does HP-RT know the year 2000 is a leap year?

A: Yes, it does:

```
# date 200002290000.10
# date Tue Feb 29 00:00:11 PST 2000
```

Q: Are SCSI floppies supported on HP-RT? I noted this in the 2.20 Release Notes.

A: SCSI floppies are not presently supported on HP-RT, up through Revision 3.00. This was inadvertently documented in the printed version of the 2.20 Release Notes, and has been corrected in electronic versions.

Q: Is there a way to retrieve my processor’s CPU number programmatically?

A: Yes, there is. Here is an example program:

```
#include <sys/reboot.h>
#include      <sys/errno.h>
/*
 * This program allows the user to view the reboot information contained
 * in stable storage. Because this function makes a reboot system call,
 * its access is restricted to superusers only. The reason for this
 * restriction is that the reboot system call accesses stable storage via
 * an architected pdc call, PDC_STABLE. Calling pdc may adversely affect
 * real time performance.
 */
ewrite(s)
char *s;
{
    write(2, s, strlen(s));
}
main()
```

```

{
    struct reboot_info rbparam;
    struct OSbootInfo *osbptr = &rbparam.BootInfo;
    register char *ptr=0;
    osbptr->OS_ID=0;
    osbptr->root_device[0]='\0';
    osbptr->boot_flags = RB_GETINFO;
    osbptr->CPU=0;

    if (reboot(&rbparam) == -1) {
        if (errno != EPERM)
            perror(ptr);
        else {
            ewrite(ptr);
            ewrite(": Must be user 0 (root) to view ");
            ewrite("reboot information\n");
        }
        exit(1);
    }

    printf("CPU Number: %d\n", osbptr->CPU);
    exit (0);
}

```

The output results, depending upon your CPU number, are similar to:

```
HP-RT# cpunum CPU number: 1
```

Q: I am attempting to install HP-RT 2.20 on my HP-UX 10.20 system. However, I cannot locate the 2.20 bits on my 10.20 media. Where can I obtain HP-RT 2.20?

A: HP-RT 2.20 can be found on the HP-UX 10.10 distribution media. If you do not have access to this revision of HP-UX, contact your local HP Response Center to begin the process of obtaining a copy. *Note:* The Response Center does not have copies available for distribution. Your Response Center Engineer will work closely with appropriate distribution channels to assist you. If you do not have a Response Center support agreement, contact your local HP sales representative.

Q: Now that I have obtained HP-UX 10.10 media, I am attempting to install HP-RT 2.20 to my HP-UX 10.20 system.

While using `/usr/sbin/swinstall`, I note the following:

```
WARNING: The product "HPRT-OS-PRD,r=A.02.20" is not compatible with
this system's architecture or operating system.
```

Does this mean HP-RT 2.20 will not work on HP-UX 10.20?

A: HP-RT 2.20 will work and is supported on HP-UX 10.20. The warning you are experiencing is due to the difference between the currently executing HP-UX 10.20 and the media revision you are reading HP-RT 2.20 from, which is HP-UX 10.10. *swinstall* is noting this difference and disallowing installation. If you set the "allow_incompatible" option to "true," the installation will proceed properly, but *swconfig* will be unable to configure HP-RT 2.20 on HP-UX 10.20 because of this incompatibility. After *swinstall* successfully finishes, you will need to execute *swconfig* with the same "allow_incompatible" option set to true. For example:

```
/usr/sbin/swconfig -x allow_incompatible=true \ HPRT-OS-PRD,r=A.02.20
```

The above example will configure the core HP-RT 2.20 product on your HP-UX 10.20 system. Review the log `/var/adm/sw/swagent.log` to confirm installation and configuration processes, and review any warning and error messages that may occur.

Q: I am executing a program on HP-RT that implements the *XmCreateFileSelectionDialog()* function. It creates an X widget to list files within a selected directory. I note that only "regular files" are listed, and device files, contiguous files, and similar types are not listed. Is there an X resource I need to set to display these files? Is there a programmatic way to do this?

A: Yes, there is both an X resource you can set, as well as a programmatic solution to displaying "special files." First, some detail:

The *XmCreateFileSelectionDialog()* function uses an internal algorithm to search and list the files within the directory that was current prior to program execution. The file search process itself is accomplished by the *XmNfileSearchProc()* procedure. The mask used by this process is defined by the *XmNfileTypeMask* resource. The default for this resource is *XmFILE_REGULAR*, which means what will be displayed by

default is “regular files.” To display all files, `XmNfileTypeMask` needs to be set to `XmFILE_ANY_TYPE`. This can be accomplished by setting the local X resource:

```
*fileTypeMask: FILE_ANY_TYPE
```

This can also be accomplished within the program by setting the above resource with:

```
Arg      arglist[20]; int      i=0;
.
.
XtSetArg(arglist[i], XmNfileTypeMask, XmFILE_ANY_TYPE); i++;
XtSetValues(dialog, arglist, i);
.
.
```

Q: What revision of HP-RT supports the 744rt processor?

A: HP-RT revisions 2.21 and 3.00 support the 744rt processor.

Q: I have a program that allocates a “pool” of memory with `malloc()` and sometime later, frees this same memory “pool” with `free()`. As long as this same program again allocates a “pool” of memory the same size as or smaller than that previously allocated, no additional memory is consumed by my process. If this program instead allocates a “pool” of memory larger than that originally allocated, I note an additional “pool+1” of memory being consumed by this process, in addition to “pool.” If I execute this same code on HP-UX, I notice the original “pool” is simply resized to “pool+1”. Why does HP-RT perform differently?

A: HP-RT uses a `malloc` routine that is unique to HP-RT, and unlike the HP-UX routine. HP-RT attempts to prevent memory fragmentation. The process of `malloc()`, `free()`, and `malloc()` or `realloc()`, using the same space, can cause memory fragmentation. HP-RT avoids this issue by causing any subsequent `malloc()` to create a new “pool+1,” instead of resizing the original “pool,” as defined with the `malloc()` function. `malloc()` will indeed use the same freed “pool” we previously allocated, if the “pool” size is less than or equal to the “pool” size previously defined, but this will not always be the case. By allocating an additional “pool+1,” HP-RT can prevent memory fragmentation, which can cause

eventual or instantaneous slower system response while `malloc()` works to consolidate memory and resize “pool” to be “pool+1.” This in turn will negatively affect HP-RT’s real-time performance, which is not a good thing for a real-time system. Thus, HP-RT will cause this process to “consume” more memory than perhaps expected, but real-time performance will not be adversely affected.

Q: When I execute `uname -l`, I see: “16-user license.” Is there any way to modify the user license for HP-RT?

A: The 16-user license is hard-coded into the HP-RT kernel and presently cannot be changed.

Q: How are “users” defined on HP-RT with regard to the user license?

A: There is one “user” for the network, if it is included within your kernel, even if no one is logged in to HP-RT via the network. If so, there are 15 “users” available for serial connections. If no networking subsystems are included within your kernel, you have 16 “users” possible for serial connections.

Q: Is `stderr` unbuffered on HP-RT?

A: Yes, it is. This allows error messages to be displayed as quickly as possible. As a comparison, `stdout` is line-buffered to a display terminal; otherwise it is fully buffered.

Q: When I execute `$HPRTroot/hpux/bin/showver`, I see information that I do not understand. What does this information mean?

A: `showver(1)` will output HP-RT version strings for HP-RT binaries located on your HP-UX host system. The embedded version strings are not readable by humans; `showver(1)` converts these strings into readable text. An example for revision 2.20 of `$HPRTroot/bin/ps`:

```
HP-UX# $HPRTroot/hpux/bin/showver $HPRTroot/bin/ps
/VOBS/utls/ps/ps.c@@/main/KIRKWOOD/3
/HP-RT/Source/src/lib/alarm.c@@/main/3
/HP-RT/Source/src/lib/bzero.c@@/main/3
/HP-RT/Source/src/lib/directory.c@@/main/3
/HP-RT/Source/src/lib/exit.c@@/main/3
```

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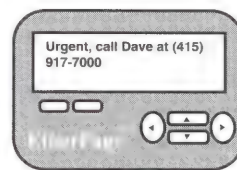
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/HP-RT/Source/src/lib/getpwent.c@@/main/3
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/HP-RT/Source/src/lib/perror.c@@/main/3
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/HP-RT/Source/src/lib/rline.c@@/main/3
/HP-RT/Source/src/lib/s_xtrncpy.c@@/main/3
/HP-RT/Source/src/lib/st.c@@/main/4
/HP-RT/Source/src/lib/usynch.c@@/main/4
/HP-RT/Source/src/lib/v_signalvec.c@@/main/3
/HP-RT/Source/src/lib/vprintf.c@@/main/4
/HP-RT/Source/src/lib/hprt_ecvt.c@@/main/3
/HP-RT/Source/src/lib/fseek.c@@/main/4
/HP-RT/Source/src/lib/isatty.c@@/main/4

This information is useful for determining what source files were used in creating the binary, and can be used by support personnel. *showver(1)* is not compatible with the HP-UX *what(1)* command. ■

HP-RT Operating System questions are answered by Geff Blaha, a support engineer in the HP-RT Expert Center. He has worked with and supported Real-Time systems for over 18 years as a Customer Engineer, Real-Time Response Center Engineer, and HP-RT Expert Center Engineer. He can be reached at geff@hpcurch.mayfield.hp.com.



CSL Perspective

ONE OF THE CONSTANT challenges of being a parent is finding teachable moments with my kids and being prepared to make the most of them. Almost on a daily basis, I find myself helping them with homework or other school-related tasks. As we work through specific assignments, review tests, or talk about a not-so-good report card, I seem to catch myself talking about organizational skills with them. As they move into high school and college, those skills will become increasingly important to their success.

Organization means to impose structure upon something; for the purpose of this discussion, let's use "information." *Structure* can be a hard term for the more free-spirited person, since we sometimes associate structure with control. I will admit that structure can sometimes play out this way, and we need to be aware of that risk. But the other extreme can be just as much of a problem. With the ever-increasing flood of information at our disposal, organization and structure are absolutely essential if we are to be able to use information to accomplish our goals.

The purpose of organizing information is primarily to maximize the value that the information contains. A collection of raw facts, taken one at a time, has some value. The surge in games and television shows that revolve around trivia certainly attribute some value to random facts and data.

It's always fun to watch the game show *Jeopardy* or play Trivial Pursuit to see what I knew. Unfortunately, when the game was over, there was little residual value for me other than to show what I didn't know. By organizing information, analysis can be employed, relationships can be seen, inferences can be drawn.

We also organize to bring order and

discipline to our lives. In many areas we need order both to survive and to thrive. Going back to the educational analogy, we could certainly memorize the facts presented by the teacher if the goal were to succeed at rote testing. But the goal of educating children is to prepare them for the rest of their lives, not to take tests. They need that foundation, built a layer at a time, to enable them to continue after their formal education is complete. They need to learn how to bring order and discipline to their surroundings.

So then, how do we organize? There is no single answer because each person develops different strategies depending on the goals to be accomplished. Grouping information by subject, time-frame, or action to be taken are some methods I've used. The information to be organized may impose its own structure and groupings. Groups that we start with may change or be subdivided because of the volume of information. Processes or procedures are another way we organize. All of us have a morning routine, a ritual if you will, that organizes and brings order to the first hours of the day. These processes may not be the same as those we followed 10 years ago, since we've been forced to adapt them to changing circumstances.

I have found some strategies that work pretty well for now, but I probably will have to adapt them in the future. Here are my Top 10:

1. Know what your goals are before you organize. Continually check progress against the goals as you move forward.
2. Establish the most successful methods and processes for you. Stick to them but adapt them when necessary.

3. Start with the big picture, quickly categorize information, then step back and look at the big picture again.
4. Before starting any analysis, collect as many facts as you can.
5. Map out a quick plan for the steps you will go through.
6. Keep a journal of your steps and the reasons for them in order to track your process. Review the journal to see where you've already been.
7. Don't overorganize a problem or you'll never get to the real value, which is analysis and solution.
8. Write stuff down. Most of us do not have steel traps for brains and there is too much information to keep track of.
9. Use whatever tools are at your disposal. Lists, spreadsheets, flow charts, index cards, post-its or whatever is handy. Don't waste a lot of time finding the perfect tool.
10. Always be ready to adapt your thinking to new situations.

The strategies we use are wide and varied, driven by our personalities, learning styles, and experiences. There is no single method that works for everyone, just many methods and ideas to draw from. Try to come up with your Top 10. I think you will gain some insight into yourself and may see some new ideas. I'll keep working with my kids; I'm sure they have something to teach me too ! ■

Paul Gerwitz is chairman of the CSL/HP-UX committee and is a technology specialist at Eastman Kodak Company in Rochester NY. He can be reached at 716-477-3067 or e-mail at gerwitz@interex.org or gerwitz@kodak.com

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V-Systems VSI Fax

Network Fax Software

V-Systems, Inc. has announced the addition of a Windows NT client to its UNIX VSI-FAX Network Fax Software, supported by character terminals and Windows

3.x, Windows 95, X-Windows, and Motif workstations. VSI-FAX host software is compatible with the HP 9000 and other UNIX platforms.

Now a user can send, receive, route, and archive faxes automatically from any Windows NT workstation networked with a VSI-FAX Server. Status on every fax can also be monitored through a GUI. Received faxes can automatically be routed with Direct Inward Dial or Dual Tone Multi Frequency technology and then displayed at the recipient's desktop.

In addition, it enables firms to integrate fax capability directly within their HP-UX applications, making faxing totally automated for transmitting purchase orders, sales quotes, invoices, or any type of document.

VSI-FAX host software is priced from \$995. Pricing for VSI-FAX Client for Windows NT begins at \$49. Quantity discounts apply.

Contact V-Systems, phone: (800) 556-4874 or (714) 489-8778, fax: (714) 489-2486, e-mail: info@vsi.com.

new products to assist customers in their UDMS education and development efforts.

The User Data Management System tools consist of UDMS Version 5.3AA, Safari ReportWriter 2.1, and VisualRPW 1.3AA. The tools offer reporting and querying capabilities for users who require client-server and host-based access to Unidata and other relational, hierarchical, and network databases.

Web Development Toolkit

Unidata has unveiled Unidata RedBack, a toolkit for building dynamic, transactional Web applications for the Internet and corporate intranets.

RedBack is designed for building advanced business-to-business and internal corporate applications requiring transactional database access and effective use of both client and server resources. Typical RedBack applications

include electronic catalogues and directories, human resource and benefits management, direct customer order placement and order tracking, continuous inventory replenishment, and ad hoc Web-based inquiry.

RedBack application users need nothing more than a standard browser. The product eliminates the need for distributed application administration, since client application components are exported automatically to the user's desktop. Users automatically get access to the latest application version each time they invoke a RedBack application.

Database Interoperability Tools

Unidata has announced new releases of two database interoperability tools in the Unidata Software Products suite—UniDesktop/ObjectCall and UniDesktop/ODBC.

UniDesktop/ObjectCall is an object-oriented, Windows-based client-side programming environment that naturally accesses nested data structures via object-oriented data retrieval protocols. It allows developers to leverage some of object-oriented programming's most powerful concepts, including classes and objects, data abstraction, and data encapsulation.

UniDesktop/ODBC Version 2.0 is Unidata's implementation of the industry-standard SQL-based API. Using UniDesktop/ODBC, users can access Unidata-resident data stores without the need for multiple database interfaces or application reengineering.

Contact Unidata, phone: (303) 294-0800, fax: (303) 293-8880, e-mail: unidata@unidata.com, <http://www.unidata.com>.

New from Legato

Distributed Storage

Legato Systems has announced GEMS (Global Enterprise Management of Storage), which provides enterprise-wide command and control for distributed storage.

A simple and intuitive Web Browser Interface provides a single, global view of an entire organization's storage management operation. Through a series of Java applets, storage administrators are able to control, configure, and monitor hundreds—even thousands—of storage management nodes spread throughout a global organization. Version 1.0 supports Web servers and browsers from both Netscape and Microsoft.

GEMS solves three important storage management issues confronting large enterprises: a consistent policy-oriented approach to storage management; a unified approach to managing

media generated by different storage management applications; and a consistent approach to licensing and distributing storage management software to the appropriate storage nodes.

Data Protection

Legato systems has also announced NetWorker BusinessSuite—a comprehensive set of NetWorker options to provide specialized data protection for mission-critical databases and applications. This new product line is focused on the needs of database administrators and IT managers for high-performance, online data protection of databases, and other enterprise-critical applications that must be available to users on a 24-hour, 7-day-a-week basis.

The combination of BusinessSuite and NetWorker provides a network-wide storage management software solution for such enterprise applications as autochanger support, automated media labeling and tracking, media cloning for local and off-site storage strategies, and support for high-speed devices and mainframe-class tape silos. The product addresses the need for cross-platform support of enterprise applications running on UNIX and Windows NT.

Storage Management

Legato Systems has announced NetWorker Power Edition, a new high-performance storage management line that focuses on protecting complex enterprise applications ranging in size from several hundred gigabytes to multiple terabytes. Power Edition is dedicated to the specialized storage management requirements of very large database (VLDB) and large file system applications.

Power Edition improves backup/restore performance on a local data

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- **PDF-related security problems, extended to detect changes in ACL specifications.**
- **Logging subsystems status display, and logfile analysis.**
- **Network-related status display and configuration weaknesses.**

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server, relative to the standard NetWorker product.

Contact Legato Systems, phone: (415) 812-6000, fax: (415) 812-6032, faxworker: (415) 812-6156, <http://www.legato.com>.

Image Processing Software

Research Systems, Inc. (RSI) has announced ENVI Version 2.6. ENVI (Environment for Visualizing Images) is an image processing application for ana-

lyzing remote sensing data. It features advanced radar, spectral analysis, and file handling tools for natural resource, environmental, and agricultural remote sensing. It can be used to visualize and analyze any type of satellite or aircraft digital imagery, including Landsat, AVIRIS, and ERS-1, among others.

ENVI provides fully integrated spectral tools such as the Pixel Purity Index (PPI) and n-Dimensional Visualizer. It improves analysis of Landsat TM, SPOT XS, and data from advanced SAR systems such as JPL's SIR-C.

ENVI is written entirely in IDL (Interactive Data Language). Users can

expand ENVI's features or create their own routines using IDL.

ENVI 2.6 is available for Windows 3.1, 95, and NT, as well as Macintosh and UNIX.

PC pricing starts at \$3,350; workstation pricing starts at \$5,750.

Contact Research Systems, phone: (303) 786-9900, fax: (303) 786-9909, <http://www.rsinc.com>.

Internal Operations Management

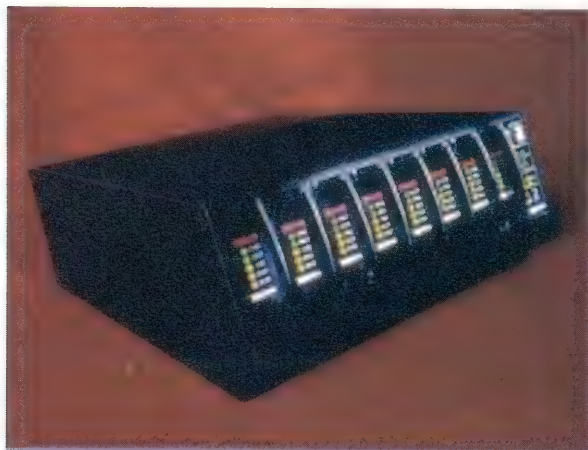
Personal Productivity Tools (PPT) has announced it has integrated its EtherPage and EtherWeb software with Remedy Corporation's Action Request System ARSystem and ARWeb. This integration provides users with a comprehensive solution for consolidating the management of such internal business operations as help desks, bug tracking, change, asset management, and sales tracking.

The integration allows ARSystem and ARWeb users to automate wireless notification of personnel based on user-specified conditions, events, or transactions occurring on Web pages, e-mail, database, or network monitoring systems. The integration also eliminates the need for personnel to monitor and then manually send multiple pages. Messages can include contact information and problem descriptions, eliminating or reducing the need for return calls—streamlining action request-to-response time cycles.

This integration requires ARSystem Version 2.1 or greater, ARWeb Version 1.1, EtherPage and EtherWeb Version 2.91 or greater, and a Hayes-compatible modem.

Contact PPT, phone: (415) 917-7000, fax: (415) 917-7010, e-mail: sales@ppt.com, <http://www.ppt.com>.

Box Hill Fibre Box



Data Storage

Box Hill Systems Corporation has announced the Fibre Box, which is said to transfer data 10 times faster than SCSI. This hot-

swappable, dual Fibre Channel Arbitrated Loop (FC-AL) storage system with RAID fault-tolerance offers capabilities of up to 72 GB per enclosure, using eight 9-GB Fibre Channel drives. Storage for up to 1,125 GB is obtainable by "daisy-chaining" enclosures, for a total of up to 125 drives per each dual FC-AL system.

The level of throughput provided by the Fibre Box accelerates any application requiring fast storage I/O. Box Hill states that improved performance will be immediately apparent in mission-critical database applications, multimedia imaging programs, and Internet and Web server programs. The Fibre Box is capable of data transfer rates of 200 MB per second and transmission distances from 30 meters to 10 kilometers.

Fibre Box features hot-swapping of all active components, including drives, power supplies, and fans. A full complement of system status indicators is located on the front panel, along with ID switches and an optional security key-lock bar. In addition, the Fibre Box supports multiple RAID levels.

Contact Box Hill, phone: (800) 727-3863 or (212) 989-4455, fax: (212) 989-6817, e-mail: info@boxhill.com.

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Programming Editor

MicroEdge, Inc. has announced the release of Visual SlickEdit Version 2.0 for X Windows. Visual SlickEdit is a programmer's editor, with cross-platform functionality and compatibility with almost any language.

Features new in Version 2.0 include API Apprentice, which reduces complicated API calls to filling out a dialogue box (supports Win32, MFC, OS/2, C-runtimes, and Java), a C/C++/Java code beautifier, difference editing, selective display (code folding), code block selections, and hex editing. For those programming on the Internet, it offers support for viewing HTML files for Netscape and Mosaic.

Version 2.0 is priced at \$395 for X Windows (excepting Linux and FreeBSD, which are \$195 each). The price is \$295 for Windows 3.1, 95, and NT, and \$219 for OS/2.

Contact MicroEdge, phone: (800) 934-3348 or (919) 303-7400, fax: (919) 303-8400, <http://www.slickedit.com>.

Java and FORTRAN Parsers

TakeFive Software has announced enhancements to the Java and FORTRAN parsers in its SNIFF+ integrated software development environment. Now, source code is quickly parsed and loaded into the symbol table without requiring a recompile. Every change to the code and documentation is immediately reflected in the SNIFF+ environment. Fault tolerance is built in so that even incomplete and uncompileable code is parsed, and a highly optimized error recovery strategy reports syntax errors on demand.

Developers can integrate their choice of editors, compilers, debuggers, and configuration management systems with a consistent GUI.

SNIFF+ Java parser determines symbol cross-references following the latest Java language specifications. It provides easy source code navigation; examination and analysis of classes, hierarchies, interfaces, and import hierarchies; and an overview of all applets and symbols.

The new parsers are priced at \$995. SNIFF+, including the C++/C parser, is priced at \$2,990 for UNIX systems.

Contact TakeFive Software, phone: (408) 777-1440, fax: (408) 777-1444, e-mail: info@takefive.com, <http://www.takefive.com/>.

New from Insignia Solutions

Windows Applications

Insignia Solutions and Sun Microsystems have unveiled NTRIGUE X client for Java. This new client is an open-systems-based applet that enables Sun's new JavaStation network computer to run Windows applications via an

NTRIGUE server over LAN or intranet environments or via remote access, and over the Internet.

The NTRIGUE X client for Java is based on the open industry standards Java and the X Window System. The combination of the JavaStations with X client for Java allows users of network computers to exploit the power of Java and run their business-critical Windows applications.

NTRIGUE is available directly through Insignia Solutions and its channel partners. NTRIGUE clients are available for all enterprise desktops including PCs, UNIX workstations, and Macintosh computers.

Application Server Solution

Insignia Solutions has released NTRIGUE 3.0, its latest version of the Windows NT application server solution for delivering Windows applications to all desktops across the enterprise and over the Internet.

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Design and Modeling Tool

Advanced Software Technologies has announced *GDDraw*, an easy-to-use, template-based engineering drawing tool that speeds up the creation of technical diagrams. Predefined templates provide symbols for such applications as software design, computer network layout, and organizations. Users can create their own design symbols and add them to existing palettes.

Groups of users from around the world can run *GDDraw* over an internal corporate network or the Internet and interact "live" with a common drawing. Changes made by any user are immediately displayed to all users.

GDDraw supports Windows, Windows NT, and UNIX. Clients and servers can run on any of these platforms and can interact through a network. Furthermore, drawings designed on one platform are binary-compatible on all platforms, eliminating the need for any data conversion.

GDDraw pricing starts at \$495 for Windows and \$995 for UNIX.

Contact Advanced Software Technologies, phone: (303) 730-7981, fax: (303) 730-7983, e-mail: info@advancedsw.com.

With NTRIGUE 3.0, users can access local floppy disk drives attached to UNIX workstations and X terminals transparently via the applications they are using. The product includes floppy support for HP and other platforms.

NTRIGUE 3.0 allows network computers and X terminals to boot directly from the NTRIGUE server using bootp and tftp services, simplifying network configuration and reducing administrative costs by removing the need for a UNIX host.

The new version enables users connected to an X Windows NTRIGUE session to disconnect from one desktop and reconnect from any desktop without having to log out of Windows NT. An enhanced configuration manager enables system administrators to configure and manage the parameters for groups of users quickly and easily without direct registry editing.

NTRIGUE 3.0 creates user home directories and profiles automatically, eliminating the duplication of existing profiles. In addition, it prevents user login and password information from being detected on the network.

Pricing begins at \$1,995 for five concurrent sessions.

Contact Insignia Solutions, phone: (800) 848-7677 (U.S.), (+44) 1 494

453300 (U.K.), <http://www.insignia.com>.

Data Communications Software

BLAST, Inc. announces BLAST 10.8 for HP-UX, which includes additional script verbs and variables; support of X modem, Y modem, and Z modem in host mode; and improved X modem support.

Secure BLAST is also included in BLAST 10.8, and is a suite of applications designed to provide an extra layer of security over existing UNIX restrictions. System administrators can now grant or deny access to BLAST functions and files based on individual passwords. Secure BLAST also enables system administrators to define multiple passwords.

BLAST's complete cross-platform product line allows fast, reliable file transfer between a wide variety of operating systems and computers. Any computer running BLAST can communicate with any other computer running BLAST. It sends large amounts of data quickly and with complete protection from errors caused by line noise and transmission delays. If a connection is lost, BLAST resumes transmission where it ended.

BLAST 10.8 is priced at \$1,395.

Contact BLAST, Inc., phone: (800) 242-5278 or (919) 542-3007, fax: (919) 542-0161, e-mail: sales@blast.com.

NT-Based Terminal Systems

PhaseNet Systems has announced WinPort, a network ready, RISC-chip-based terminal product that allows the user universal access to both the existing UNIX-based X protocol host systems and NT-based server networks from one terminal unit under a common, simultaneously operating windowing environment. PhaseNet also has announced WinTerm, a dedicated NT terminal system based on Wyse technology.

With these products, the user has universal access in heterogeneous networking environments.

Prices for WinPort range from \$1,100 to \$2,400; WinTerm is priced from \$650 to \$1,400 per user.

Contact PhaseNet, phone: (503) 531-2480, fax: (503) 531-2401, e-mail: info@phasenet.com, <http://www.phasenet.com>.

Message-Oriented Middleware

Veri-Q, Inc. has announced VCOM 2.4, message-oriented middleware that provides reliable, scalable data communications technology for enterprise-wide, application-to-application communication in heterogeneous computing environments. It is now designed to accommodate change transparently.

VCOM 2.4 adds SNA/APPC support to VCOM/NT, including support for both TCP/IP and Named Pipes.

Contact Veri-Q, phone: (415) 908-1313, fax: (415) 908-1436, e-mail: veriqinc.verijxb@memo.volvo.se, <http://www.verimation.se>.

Hard Disk Drive

Cybernetics has announced CY10XP, a 10-GB, 5.25-inch hard disk drive that provides an average sustained transfer rate of 27 MB per second. Featuring an

Ultra SCSI interface, an 8-MB data buffer, and an 8.5 millisecond seek time, the CY-10XP can be integrated into any high-performance workstation or server. It can also be configured in an external desktop or rack mount enclosure. The drive is host- and operating-system-independent and offers a MTBF of 300,000 hours.

CY-10XP can also be used in data acquisition applications to collect data at extremely high speeds.

Contact Cybertetics, phone: (804) 833-9000.

New from Imperial Technology

3.5-inch Solid-State Disk

Imperial Technology has announced the MegaRam-35, packaged in an industry-standard 3.5-inch form factor that accommodates a storage capacity of up to 536 MB. It is said to be the industry's only 3.5-inch solid-state disk.

The MegaRam-35 has an access time of 35 microseconds (0.035 milliseconds). It supports more than 1,200 I/Os per second and includes a SCSI-2 interface that supports transfer rates of 10 MB per second. It also offers optional internal battery and disk backup modules and built-in diagnostics.

The MegaRam-35 now features a proprietary power error detection and correction system. Errors as large as 2 bytes can be dealt with by the MegaRam-35 circuitry and firmware without data loss or interruption of system performance.

SCSI-2 Solid-State Disk

Imperial also has announced its MegaRam-3000 solid-state disk, which features SCSI-2 Fast & Wide interfaces with a transfer rate of 20 MB per second per port, an access time of only 0.035 milliseconds, and a capacity range of 67 MB to 3.018 GB.

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Internet address: sales@minisoft.com

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The MegaRam-3000 comes standard with dual NiCad battery packs and an interface that can be switched from single-ended to differential with a simple jumper. Built-in diagnostics constantly patrol in the background, even checking the condition of the batteries and warning the operator if a problem is discovered.

The MegaRam-3000 can be configured with redundant power supplies and an internal backup disk drive, effectively creating an uninterruptible power system.

Contact Imperial Technology, phone: (800) 451-0666 or (310) 536-0018, fax: (310) 536-0124.

Telecommunication Software

SYNCHRONIX has announced Ecopad, a new telecommunication optimization software that increases the efficiency of transmitting data over UNIX local area and wide area networks.

In conventional UNIX systems, a signal representing each character typed on a

keyboard makes a return trip to the server before being displayed; Ecopad eliminates most of these "echo" frames and immediately displays typed characters. Only differences between successive screen images are transmitted over the network rather than entire displays, reducing the amount of exchanged data. Transmission volumes are also lowered through selective data compression done on the fly. During work sessions, Ecopad identifies and memorizes frequently used screen displays, sending a single command code to display these screens locally.

Ecopad increases network efficiency and performance two to five times, and display speed three to eight times. Volume-related telecommunications costs are lowered by as much as 75 percent. The system also has a statistics module that allows for real-time analysis of the reduction in data flow.

Contact French Technology Press Office, phone: (312) 222-1235, fax: (312) 222-1237.

Continued on Page 76

C++ Interpreter

NewCode Technology, Inc. has released its Windows NT version of NCi, its embedded C++ interpreter product that is said to improve the ability of developers to enhance mission-critical C++ applications, components, and systems.

With NCi, changes to new or existing applications can be made in real time. NCi enables interpreted code and compiled code to call each other, as well as to integrate seamlessly and transparently. It allows applications to be updated, tested, and diagnosed without being taken offline, so they are interactively enhanced.

NCi is available on Windows NT and 95 working with Visual C++ and on HP-UX working with the HP C++ compiler. Pricing for development starts at \$5,000; pricing for deployment is subject to volume and use.

Contact NewCode Technology, phone: (800) NEW CODE or (508) 454-7255, fax: (508) 454-7559, e-mail: info@newcode.com.

Web-based Helpdesk

UniPress Software, Inc., has announced FootPrints, a Web-based helpdesk system designed to record and track problems, solutions, bugs, and change requests and to make the information available to anyone with access to the Internet.

Users make entries, or "footprints," into a database created with FootPrints and can assign priority, status, and a description to each entry. Users can view, edit, and update entries as needed. FootPrints will automatically send e-mail to relevant users when changes have been made. It also supports user-defined fields and includes extensive reporting capabilities.

FootPrints supports "customer" user

accounts, which allow a class of user with password access to view and search FootPrints solutions databases and to submit queries. FootPrints also supports "guest" users who are further restricted to read-only access to the solutions database.

The FootPrints Starter License includes the server software and three user licenses and is priced at \$1,995. Additional user, guest, and customer licenses are priced at \$495 each. FootPrints requires a UNIX or Windows NT Web server and supports all Web browsers.

To evaluate FootPrints, users should go to the UniPress Web site (<http://www.unipress.com/footprints>), where they can become part of an online project or can download the software to test it on their own systems.

Contact Unipress Software, phone: (800) 222-0550 or (908) 287-2100, e-mail: info@unipress.com, <http://www.unipress.com>.

Business-to-Business Trading

St. Paul Software has announced WEB EC, a service that enables companies to perform electronic business-to-business transactions via the Internet using a standard Web browser.

WEB EC allows trading partners to enter data into the Internet-enabled HTML document screens or through business-to-business catalogues.

With WEB EC, large companies can incorporate all their trading partners with minimal effort and investment. Web EC gives small partners everything they need to transmit electronic transactions. Large companies benefit by receiving all their data electronically. Small companies benefit by not incurring the costs of traditional EDI software.

Contact St. Paul Software, phone: (612) 603-4400, e-mail: info@spedi.com,

<http://www.stpaulsoftware.com>.

Mainframe-to-UNIX Text Editor

Treehouse software has announced SEDIT, a UNIX text editor that emulates the XEDIT and ISPF/PDF mainframe editors. SEDIT supports mainframe commands and keystrokes and provides additional editing features that enable users to make a smooth transition to UNIX. Users can increasingly make use of native UNIX features and capabilities.

SEDIT supports all popular XEDIT and ISPF/PDF commands and offers an FLIST-like utility for navigating through UNIX directories. SEDIT's GUI mode provides users with the ability to simultaneously edit several files. SEDIT also remembers (and can automatically recall) previously entered commands so that the user does not need to retype them.

By searching for files in the directories described in the PATH environment variable, SEDIT allows the user to specify a file by its unique file name (e.g., "benefit.c") rather than identifying it by the full UNIX path name (e.g., "usr/fred/payroll/benefit.c"). SEDIT provides additional editing features that extend its capabilities beyond those of XEDIT and ISPF/PDF, the company notes.

SEDIT supports HP-UX and other UNIX platforms.

Contact Treehouse Software Inc., phone: (412) 741-1677, fax: (412) 741-7245, e-mail: sedit@treehouse.com, <http://www.treehouse.com>. ■

Attention vendors: New product announcements should be sent to New Products Editor, hp-ux/usr magazine, Interex, P.O. Box 3439, Sunnyvale, California 94088-3439, USA, or e-mail: pollace@interex.org.

Deadline for submission is 2 1/2 months prior to publication.



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The *hp-ux/resource directory* is a complete resource guide for HP-UX users seeking answers. This is one of the industry's most extensive reference guides for HP-UX products, services, and vendors. It will be devoted entirely to HP 9000 users operating in multi-user, workstation, and multi-system UNIX environments. This bi-annual directory, published each year in March and September, is a separate publication mailed out with *hp-ux/usr* magazine, the only HP-specific publication on the market.

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Application Development Tools	Graphics	Production Planning
Application Development Tools/4GL	Groupware	Project Management
Application Engineering	Hardware	Programmer's Editor
Backup/Restore	Hardware/Mass Storage	Protocol Converters/Interfaces-Hardware
Backup Software	Hardware Subsystems	Publications
Bar Code Data Collection Systems	Help Desk Management	Public Safety Software
Batch Job Management	Human Resources & Personnel Systems	Quality Assurance Tools
Books	Image Processing	Records Management
Business-Critical Application Development & Deployment	Image Storage & Retrieval Management	Rentals
Business Software	Industrial Terminals	Report Viewing, Printing, & Distribution
CD-R	Input Devices	Report Writers
CAD Software/Hardware	Instrument Control	Sales & Marketing
Change Management for Software Development	Integration Tools	Scheduling
Change Management Tools	Internet	Scheduling/Task Management
CheckPoint Restart Facility	Internet Commerce	Security
Client-Server	Internet/Intranet	Service Repairs
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Communications	Internet Solutions	Software Backup
Communications Servers	Inventory Control	Software Development Tools
Communications Software	I/O Boards	Software Distribution Tools
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Database Management Tools	Mass Storage	System Management
Data Center Management	Mass Storage Peripherals	System Management Tools
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Decision Support Systems	Memory Upgrades	3-D Porting Tool
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hp-ux/resource directory

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	FIRST LISTING	EACH LISTING THEREAFTER	TOTAL
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